FOOD MANUFACTURE

Incorporating Food Industries Weekly

...ED HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 MAY 1, 1954

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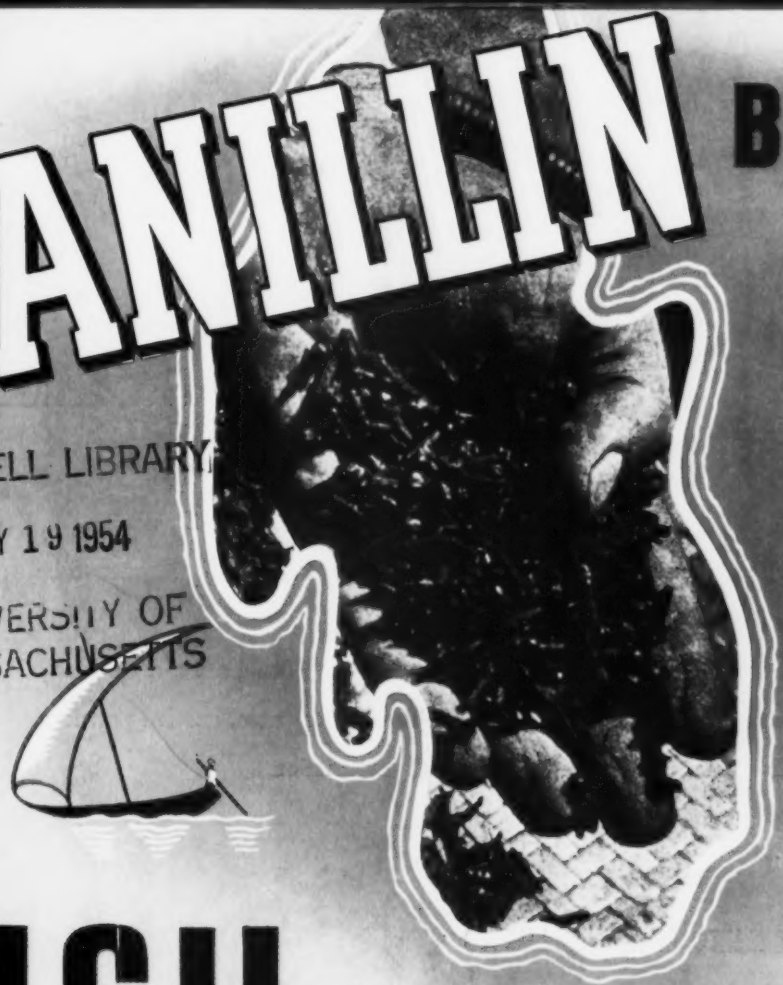

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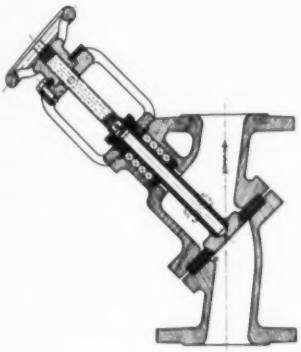

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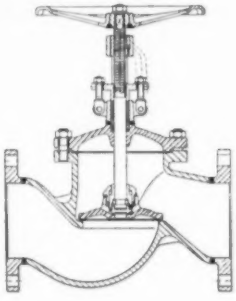

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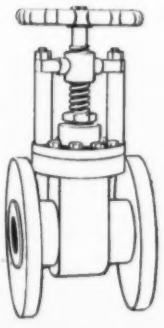

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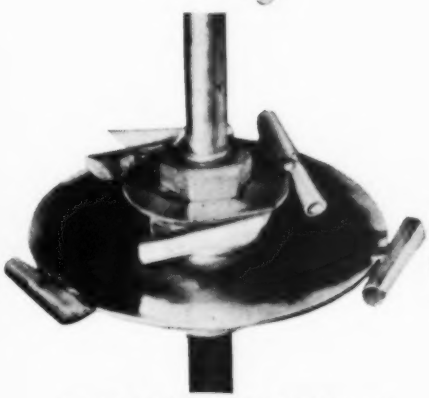
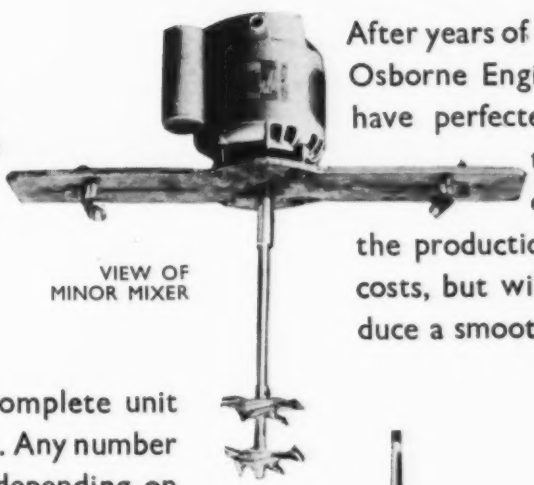


VIEW OF MIXING HEAD SHOWING ANGLES OF TUBES



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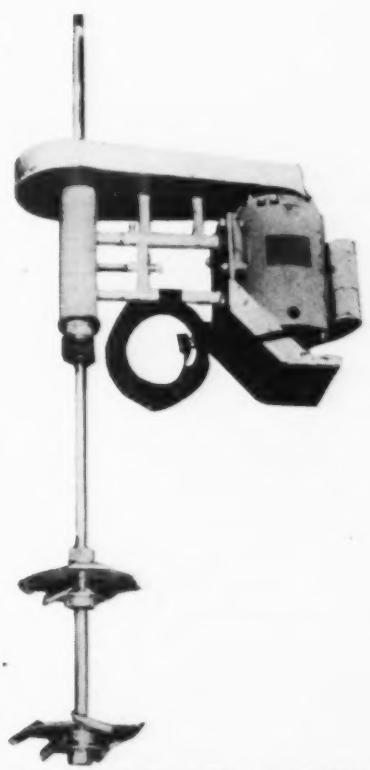

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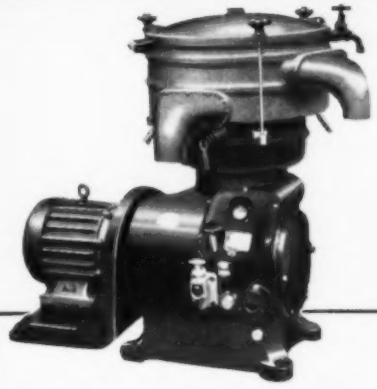
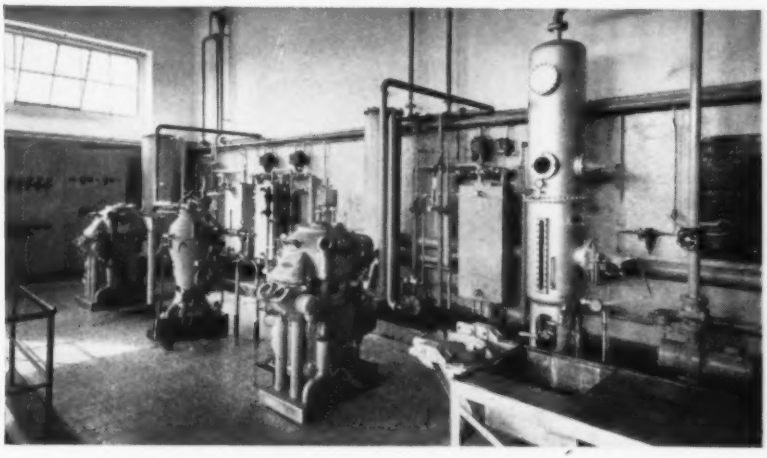


DE LAVAL CENTRIFUGAL SEPARATORS

For the continuous separation of immiscible liquids or clarification of one liquid. The type illustrated is a vapour tight model of capacities up to 2,000 g.p.h. Smaller machines are available from 5 g.p.h. upwards. These machines are widely used for solvent separation in counter current solvent extraction systems.



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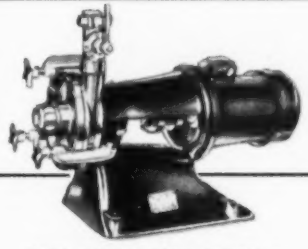

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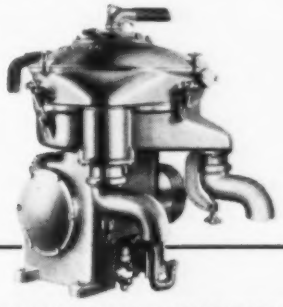

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For the continuous 2-way and 3-way separation of liquids and solids. Capacities up to 6,000 g.p.h. of liquids containing higher percentages of solids.

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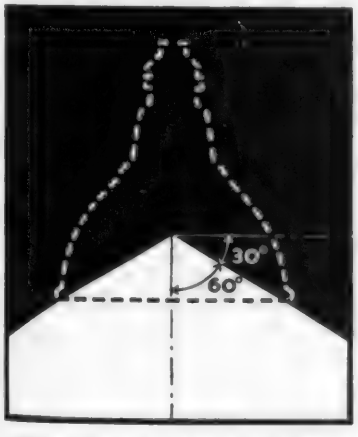
for Quality Lighting

Benjamin—renowned for quality in industrial lighting—now take a great step forward by introducing the Deep Bowl Reflector. Indeed, this is one of the major advances in quality lighting of modern times. By its increased depth, this reflector provides maximum comfort and clarity of vision.

This fitting with its unbreakable plastic 'Visor' is particularly suitable for the food and allied industries where the danger of broken lamps entering the food products must be completely eliminated.

The illustration shows the Deep Bowl Reflector with Heavy Duty Top and Dust-proof 'Visor.' These features should always be specified . . . and remember—first-class lighting demands first-class accessories! Benjamin give you all this and at practically the same cost.



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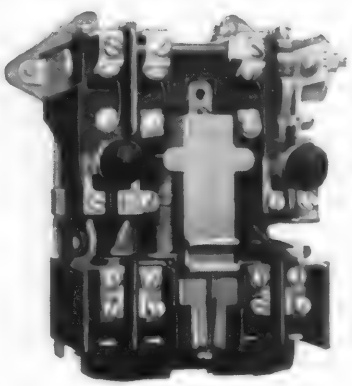

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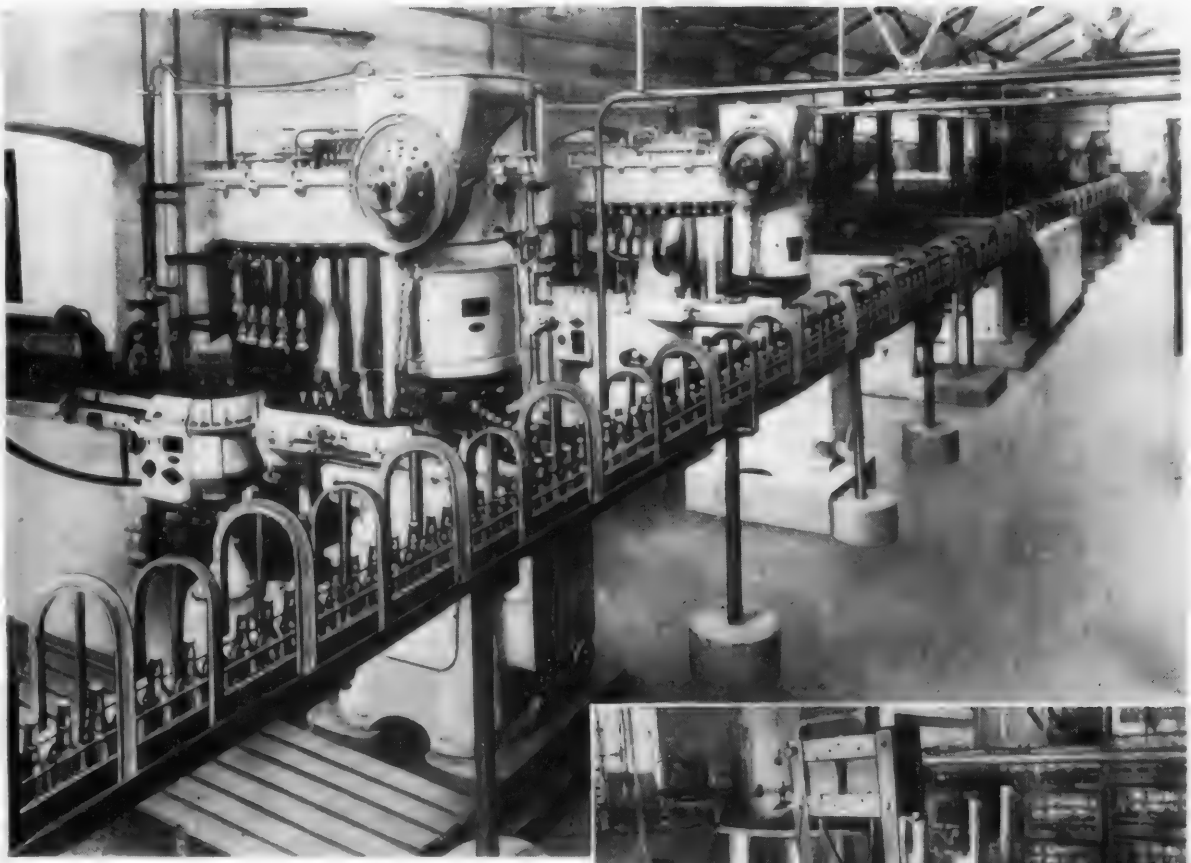

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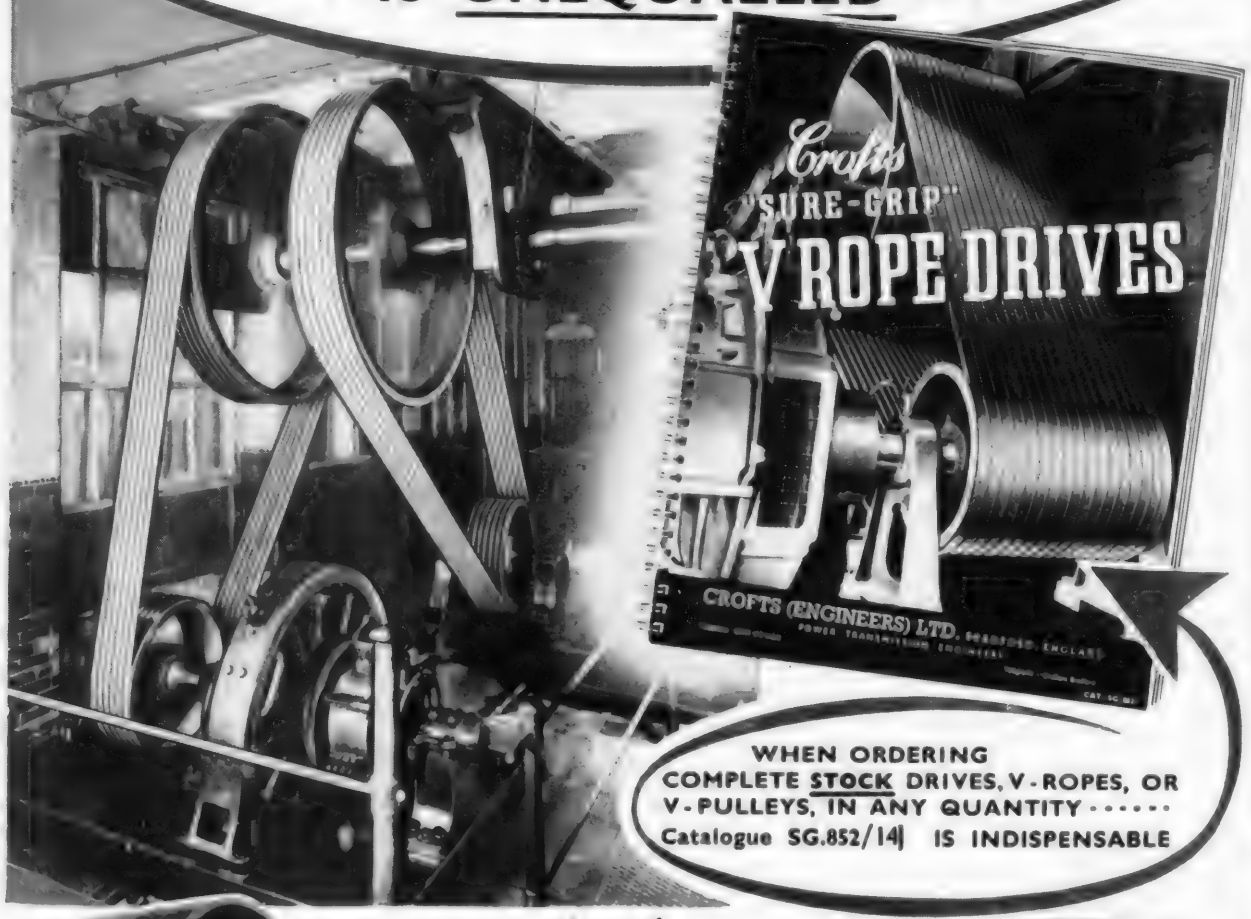

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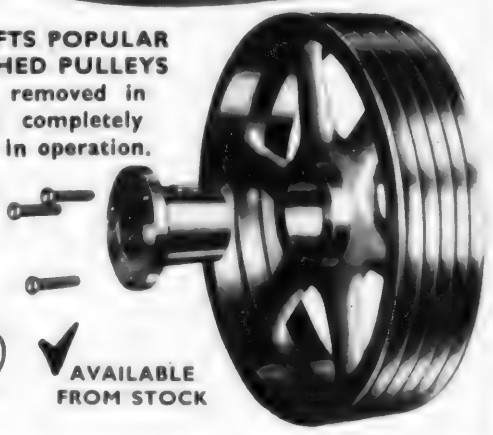

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helps the food industry

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Scandura conveyor in a fish canning factory (by courtesy of Fisher & Ludlow Ltd., Birmingham)

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lightness, strength, workability,
resistance to corrosion

Add to these the special skills, the
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of High Duty Alloys and . . .

. . make it in HIDUMINIUM

Regd. Trade Mark

Illustration shows Crankcase and Outrigger Bearing Bracket for 49 c.c. 2-stroke engine, Pressure Die Cast in Hiduminium.

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Fluorescent lighting is as good as daylight — only more consistent. It is efficient; it is economical; and it is *flexible*. You can ' tailor ' it, easily and exactly, to the special requirements of production at all stages.

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Electricity for PRODUCTIVITY

Issued by the British Electrical Development Association

xxx

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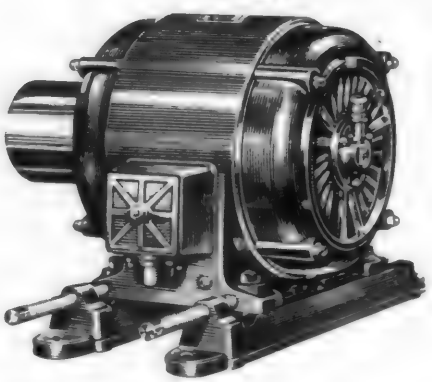

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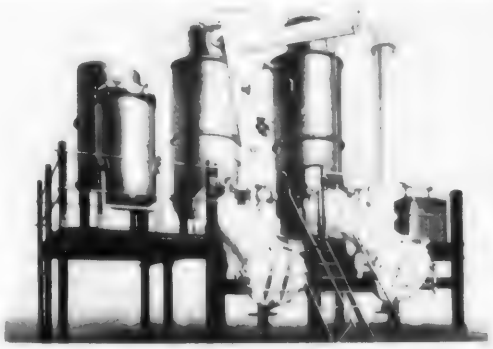

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WITH THERMO-COMPRESSION

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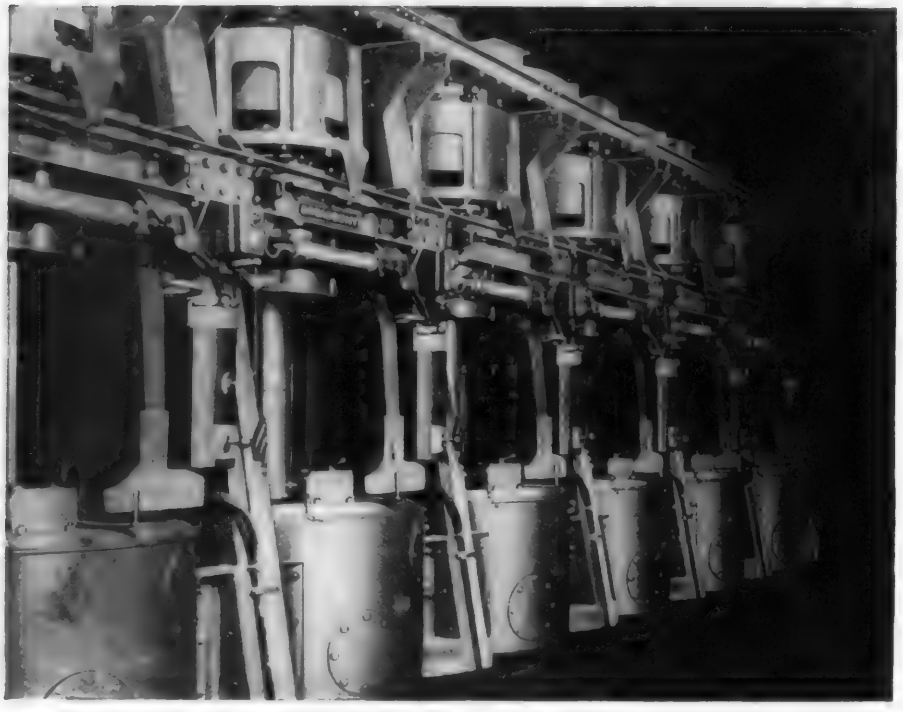

This modern battery of high speed Broadbent Centrifugals in Australia processes a large output of superior quality white sugar.

FOOD RAPIDLY AND HYGIENICALLY PROCESSED THE BROADBENT WAY

To process modern foods economically, effectively and with maximum output, insist on installing BROADBENT HIGH-SPEED CENTRIFUGALS. The extensive range covers numerous applications and the prepared food retains its original flavour and purity as suitable corrosion resisting materials are used.

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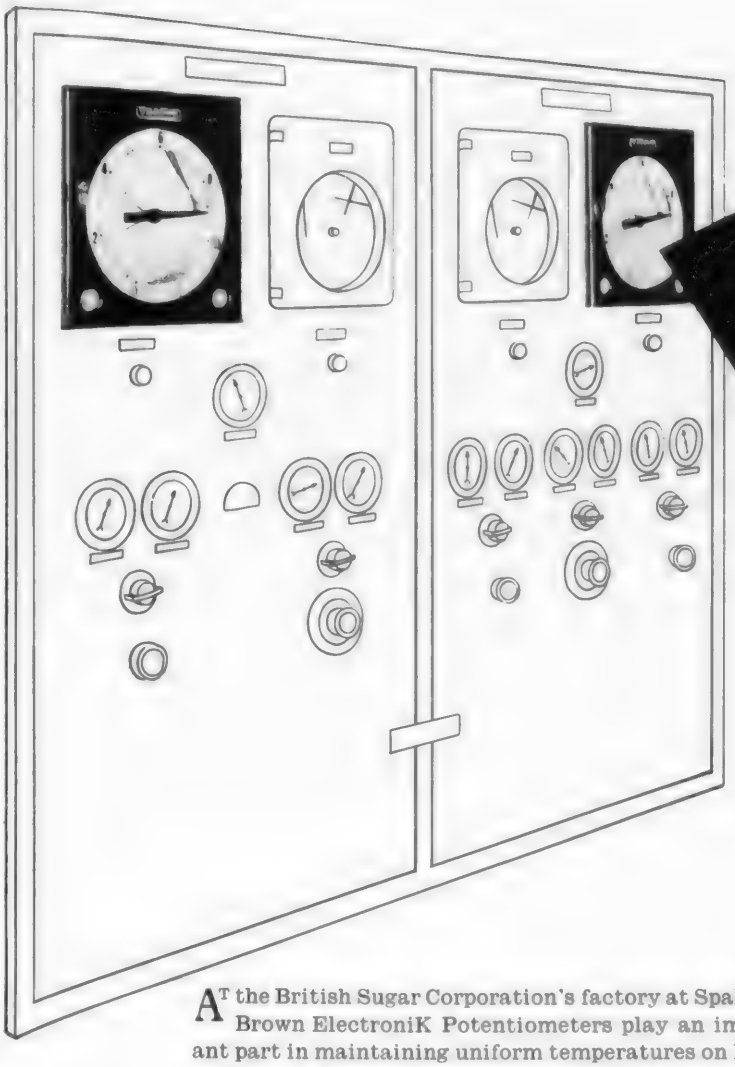

BROWN *ElectroniK* POTENTIOMETER CONTROLLERS *FORM INTEGRAL PART OF* ROTARY PULP DRIER CONTROL

AT the British Sugar Corporation's factory at Spalding, Brown ElectroniK Potentiometers play an important part in maintaining uniform temperatures on Nos. 2 and 3 pulp driers. A thermocouple in the furnace duct relays temperature changes to the Brown instrument, which automatically adjusts the Hagan control regulating the speed of the travelling grate stoker. Constant inlet temperatures are thus maintained. Brown ElectroniK Potentiometers have innumerable applications in modern process control, because their robust construction and ease of maintenance mean that they will give maximum service hours whatever the position of the installation. Accuracy and precision are assured by their unique "continuous-balance" principle whereby the slightest change of thermocouple E.M.F. is detected instantaneously by the instrument. Available with either electric or pneumatic control forms, these instruments provide the utmost reliability, whether for indicating, recording and or controlling. Please write for Application and Specification Bulletins.

Hagan Pulp Drier
Control System
designed and installed by
James Gordon & Co. Ltd.

Illustration
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Starch
does surprising things
IN SUCH SURPRISING PLACES
Example
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Bonding materials made from starch are widely used by foundrymen as binding agents in the making of sand cores. These 'cereal binders,' as they are called in the trade, are economical in use, they help to make firm, clean, permeable cores which break down easily after casting, and they fortify moulds against erosion. The first cereal binders ever offered to the foundry trade were the Kordek and Kordol range developed 20 years ago by Corn Products Company Limited, the Industrial Division of Brown & Polson. Today, Kordek and Kordol are the most widely used cereal binders in the industry, and their names are household words among foundrymen everywhere.
Brown & Polson Industrial Division produce 200,000 tons of starch products a year... more than 400 different products, which are helping more than 80 different industries to reduce production costs, to make better products, or even to make products that could not otherwise be made at all. We have spent more than 100 years in the building of this large and varied business. We have learnt a lot about the industrial uses of starch products, and our advice is freely at your disposal.
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Watch the National press for advertisements like this one. When you read how starch products are helping other industries you may see new possibilities of turning them to account in your own business.

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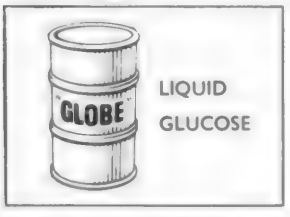
Most jam manufacturers have encountered the problem of making jams that contain enough soluble solids to be satisfactory in quality, yet are not too sweet for their customers' taste and will not crystallise in storage. Most jam manufacturers are also aware that the best answer to this problem is to use less cane or beet sugar (sucrose) in their jams and make up the required soluble solids content with "Globe" liquid glucose. Glucose provides abundant food energy but is not as sweet as sucrose. When glucose is used in jam making to replace some of the sucrose it reduces excessive sweetness without reducing food value; it brings out the natural flavour of the fruit; it helps the jam to set; and it prevents crystallisation.

"Globe" liquid glucose is made from starch by Corn Products Company Limited—the Industrial Division of Brown & Polson—and we make the starch, too. Our careful control of every manufacturing process from the grain to the finished product is your assurance of the quality and purity you require in your preserves.



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THE INDUSTRIAL DIVISION OF B&P Brown & Polson

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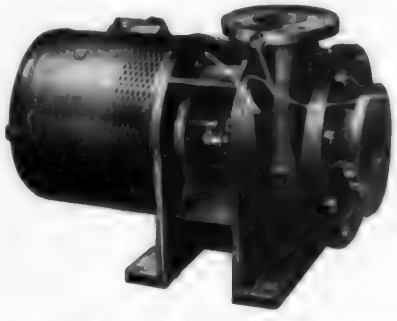
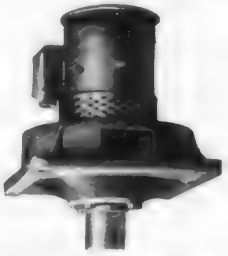
MULTI-STAGE PUMPS arranged as direct coupled units (as illustrated) with flexible coupling and baseplate. Pump internals can be dismantled without breaking pipelines. One gland only (low pressure), thus eliminating any trouble with high-pressure glands. Hydraulic balance of impellers. In 7 sizes from 1 in. to 5 in., 6 in. for heads up to 800 ft.

SAFRAN
REGISTERED TRADE MARK
PUMPS

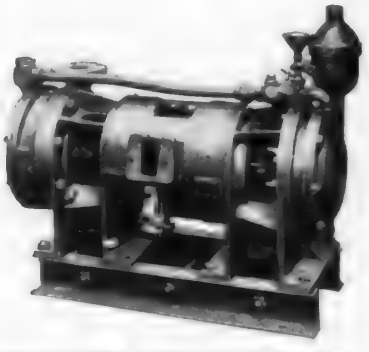
preferred for performance



UNISHAFT ELECTRIC PUMPS noted for efficiency combined with compactness. The sturdy simplicity of design commends it to engineers everywhere. In 8 sizes from ¾ in./1 in. to 5 in./6 in. for duties up to 60,000 G.P.H.

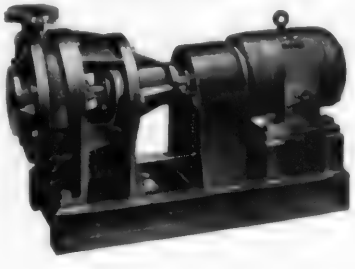


TRUNK PUMPS with ground-level motor and immersed pump. For pumping out of wells and similar duties. With one-piece or multi-section shafting to suit the depth of pit. These pumps can be conveniently arranged for automatic float operation.



SELF-PRIMING PUMPS with Unishaft drive from central motor to main and air priming units. The whole mounted on a rigid baseplate. The constantly running air pump permits the main pump to work 'on snore'.

DIRECT COUPLED ELECTRIC SETS
Standard Safran Pump flexibly coupled to electric motor for engineers who prefer the conventional bedplate-mounted pump. Available in 8 sizes from ¾ in./1 in. to 5 in./6 in.



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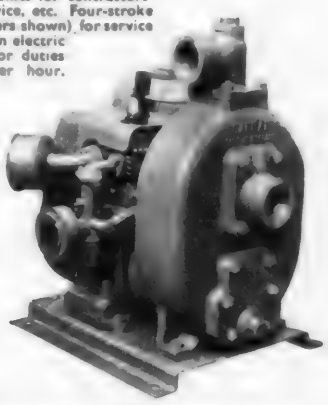

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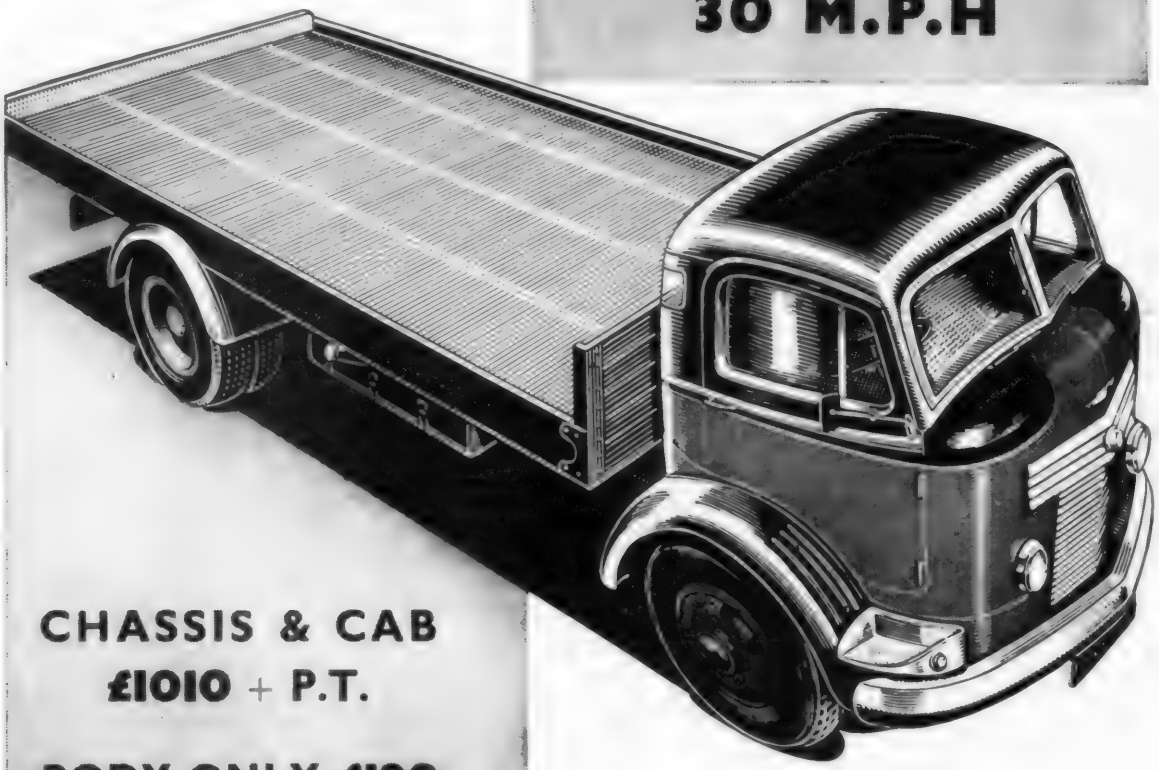

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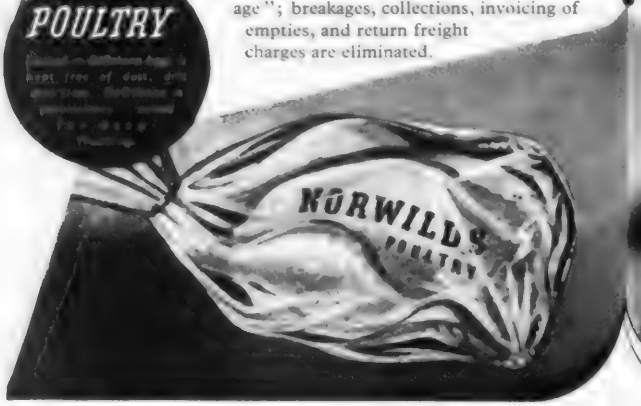

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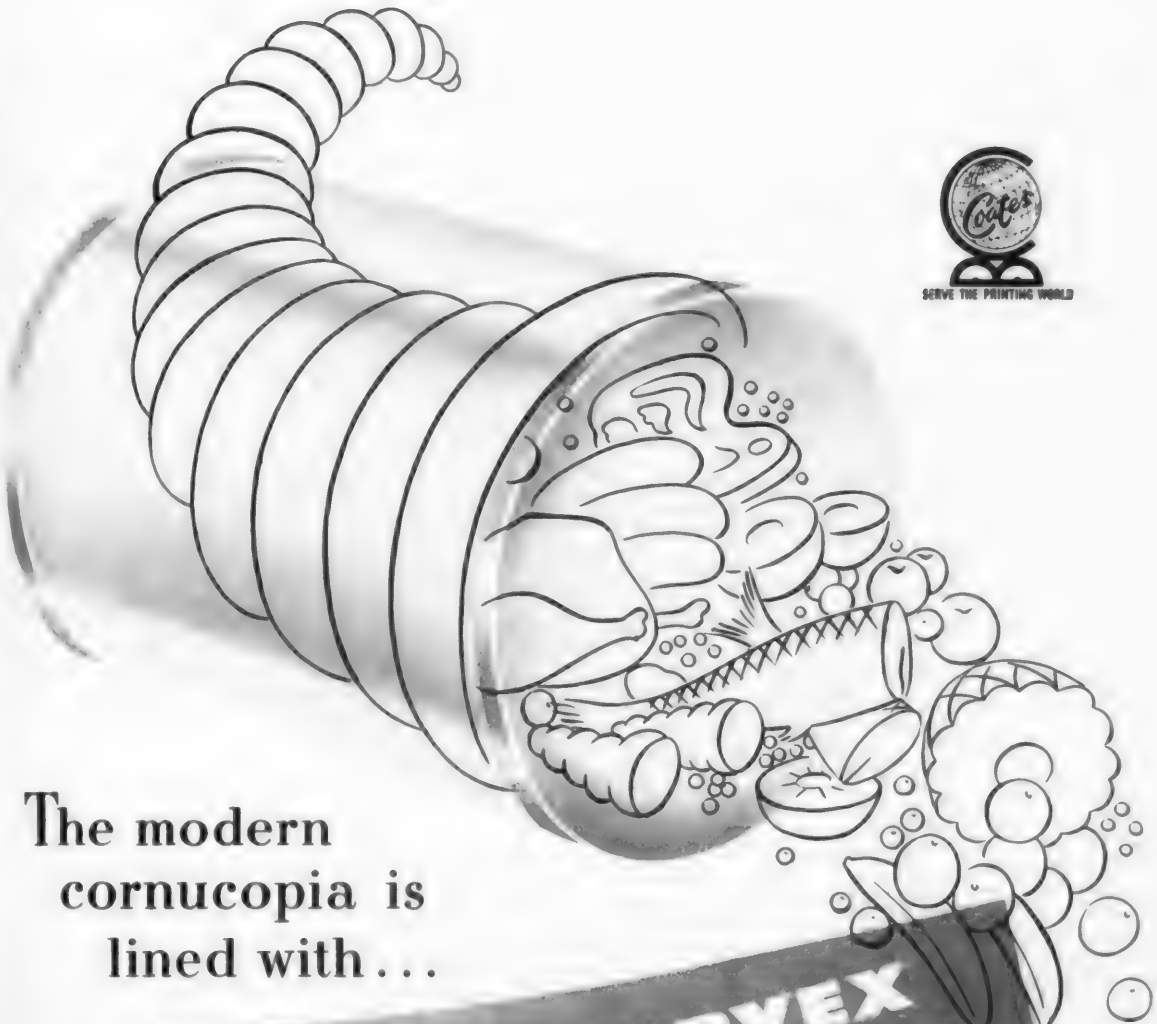

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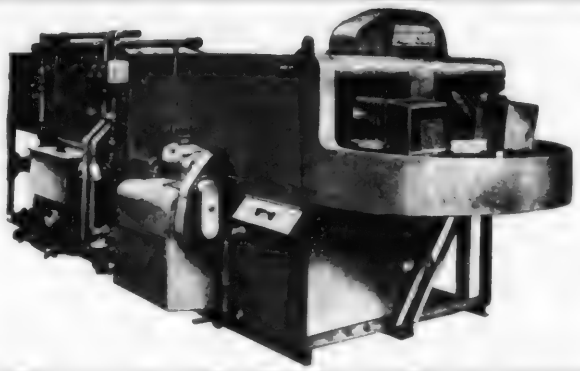
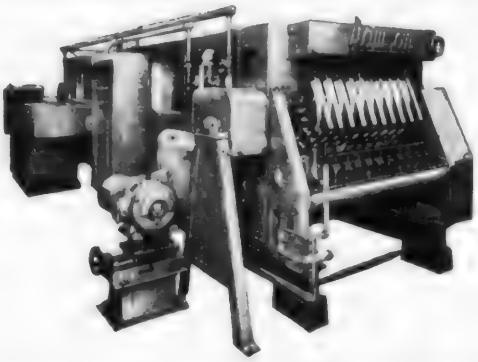


BISCUIT TIN AND CAN WASHER



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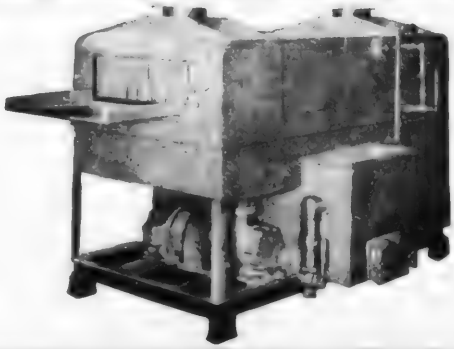

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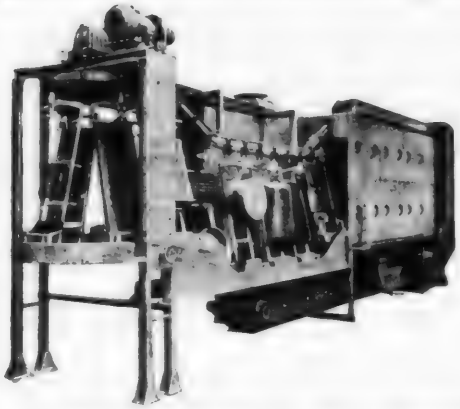

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ANNOUNCE

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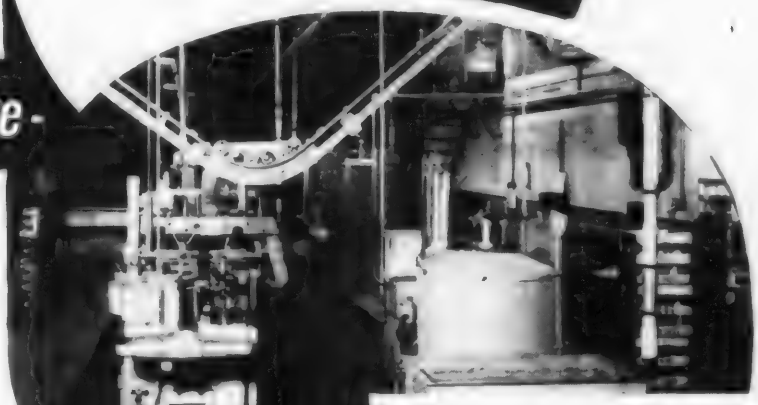
There's a Spanner in the works . . .

but not here -



Adamantine Tiles bedded and jointed in a special Semtex cement in the Co-operative Wholesale Society's Mineral Water Factory, Liverpool.

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SEMTEX

INDUSTRIAL DIVISION

a Dunlop Company

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SPECIALISTS IN INDUSTRIAL ANTI-CORROSION TREATMENTS · FLOORING AND DECKING CONTRACTORS

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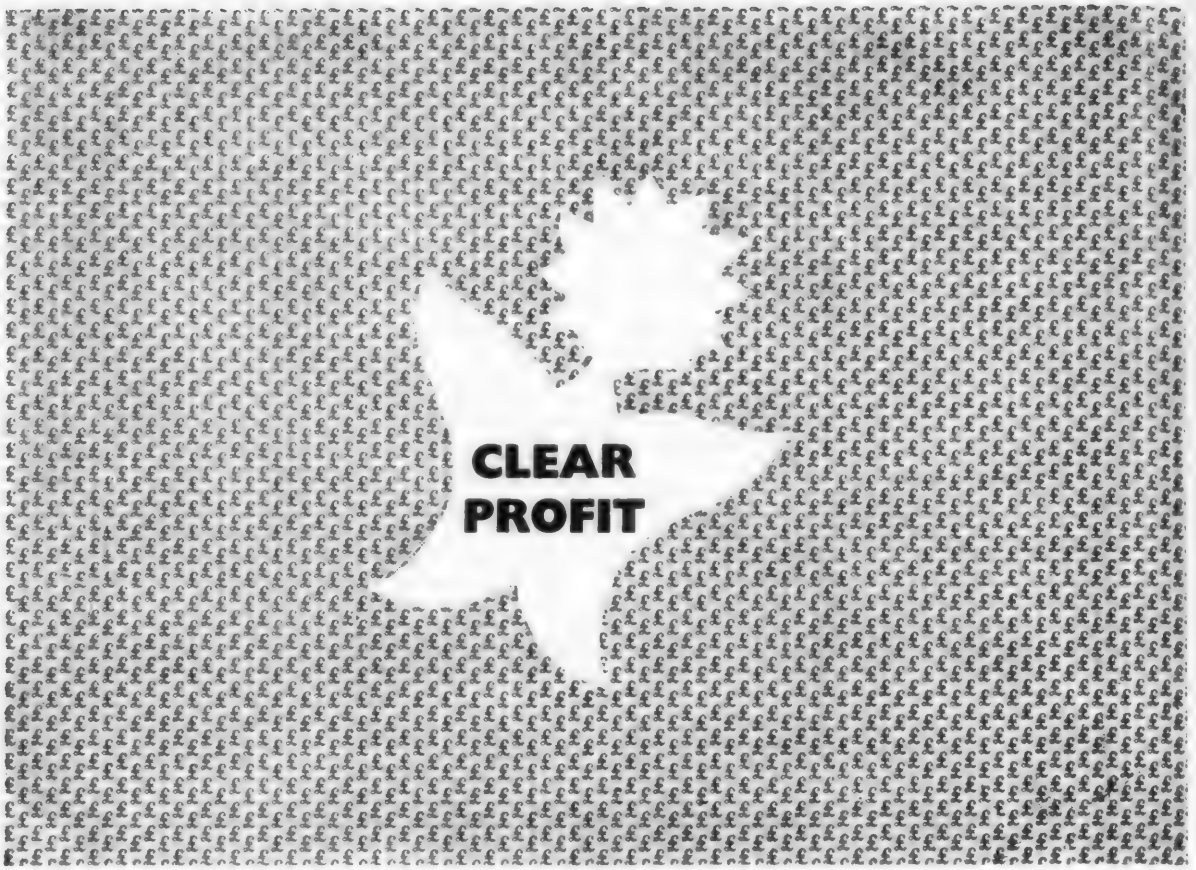

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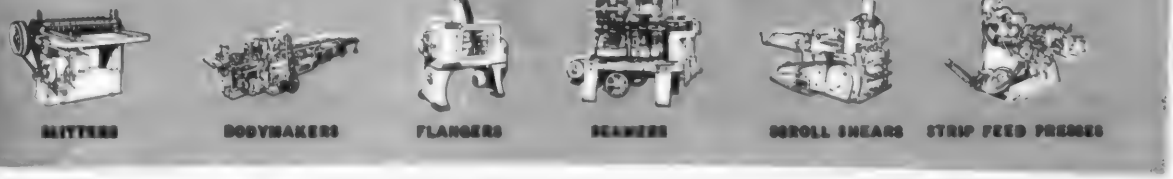

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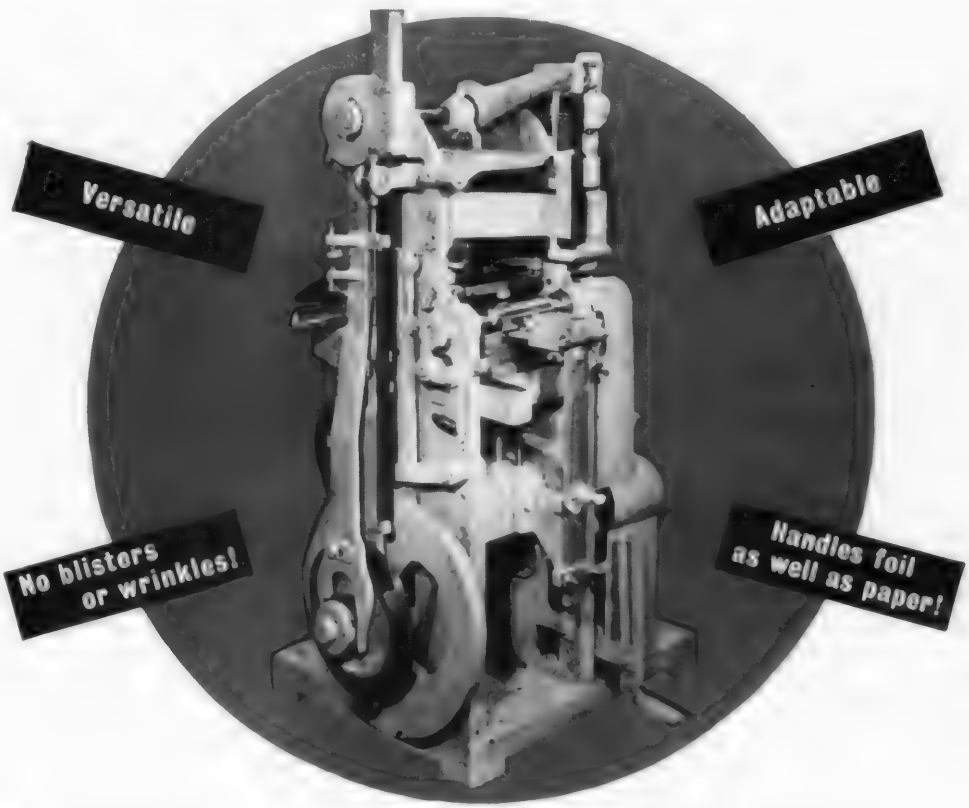

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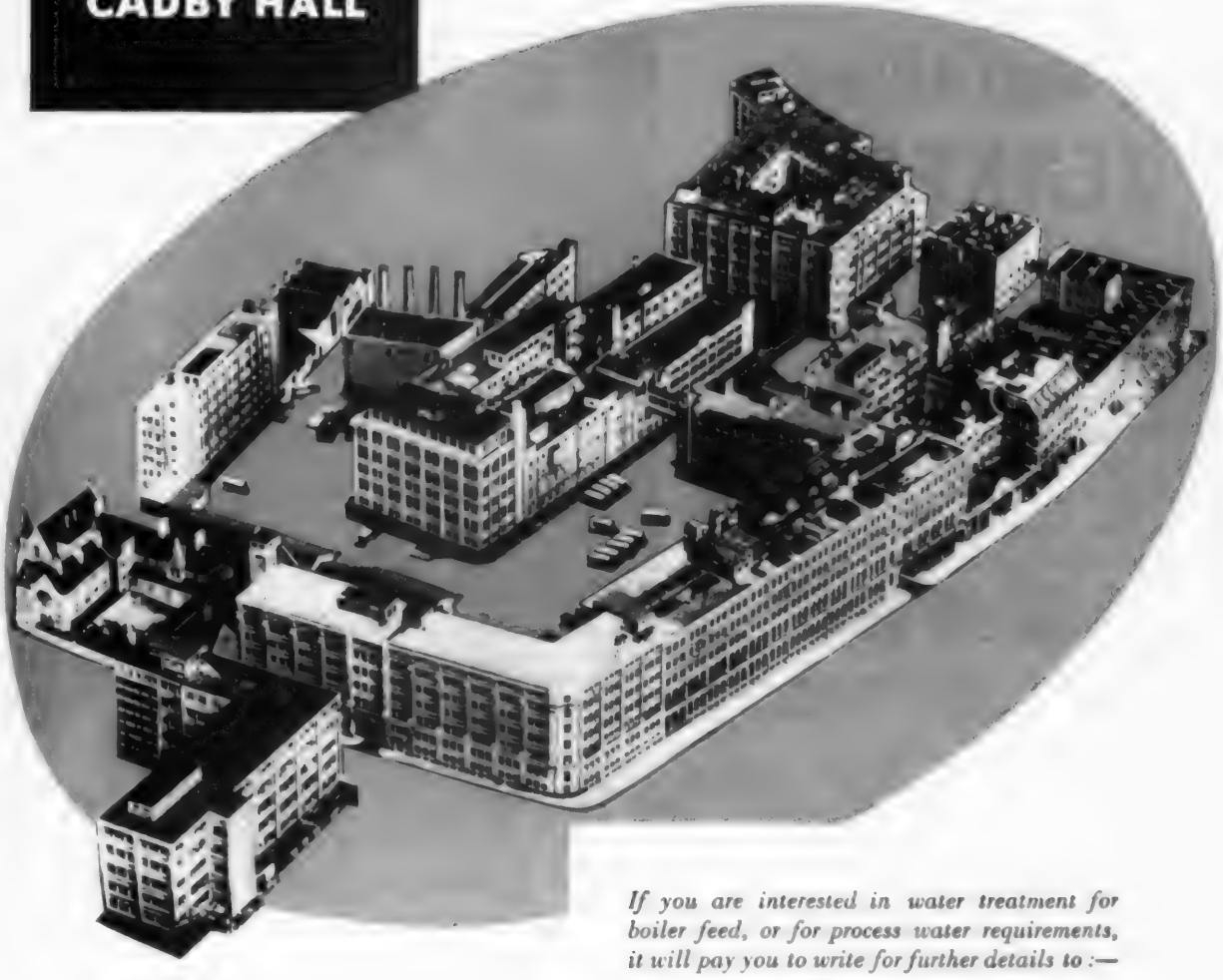

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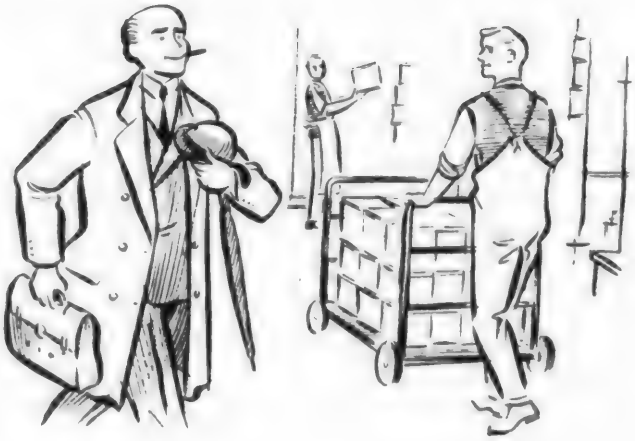

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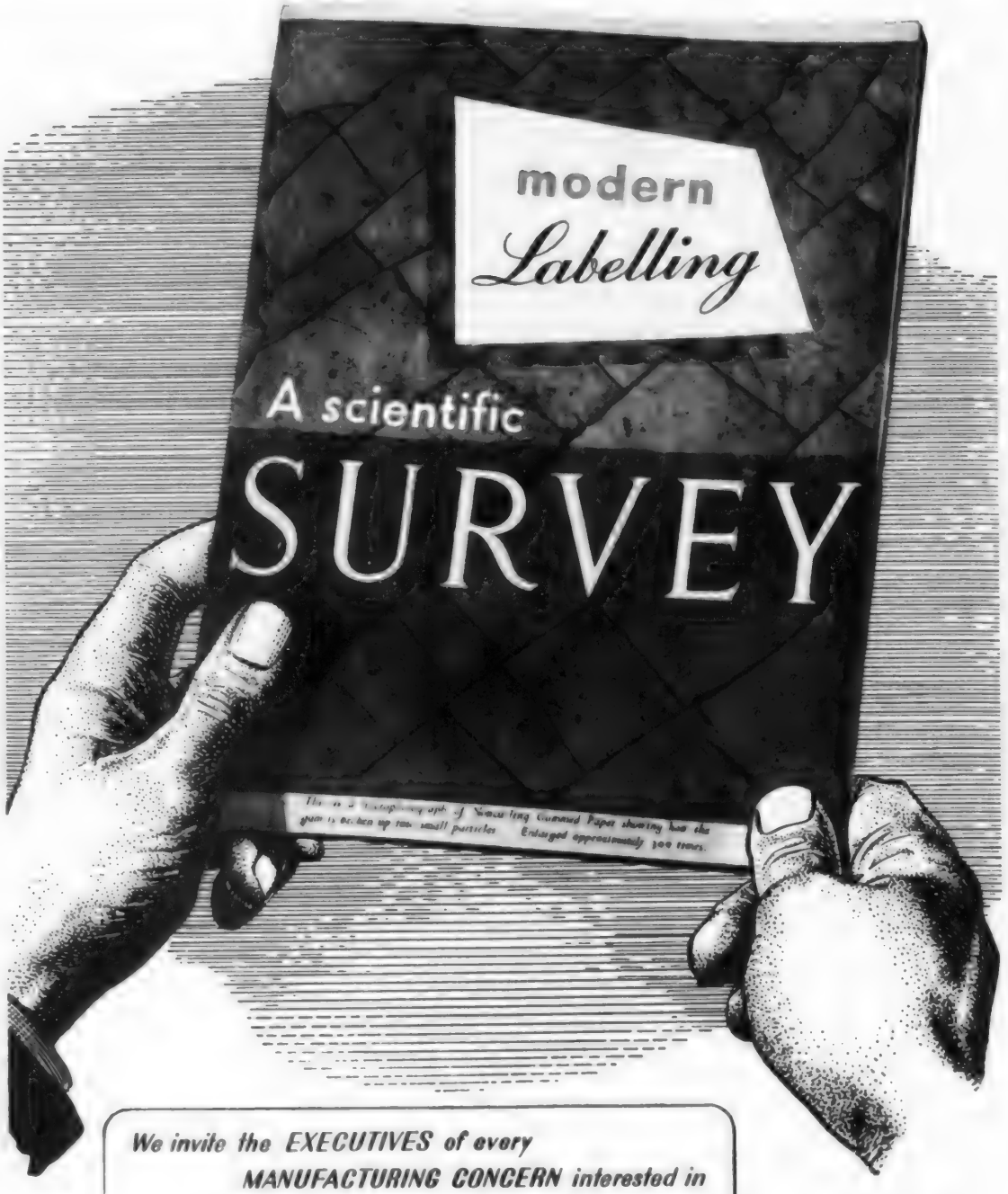

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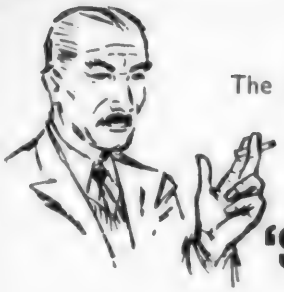

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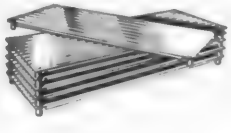

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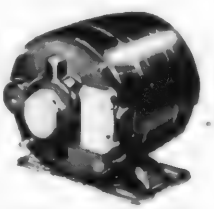

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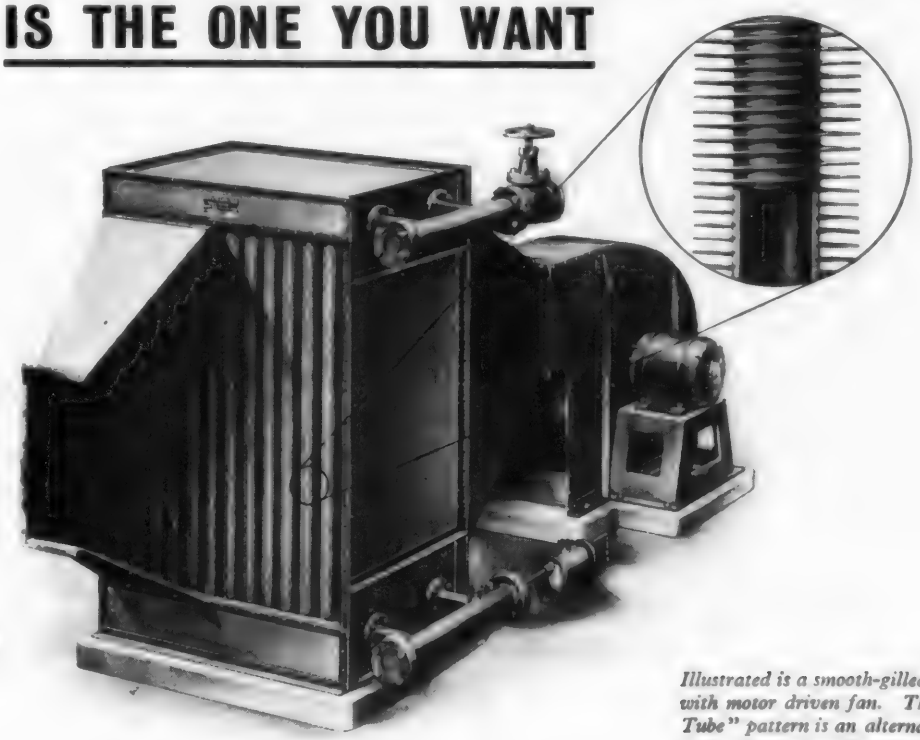

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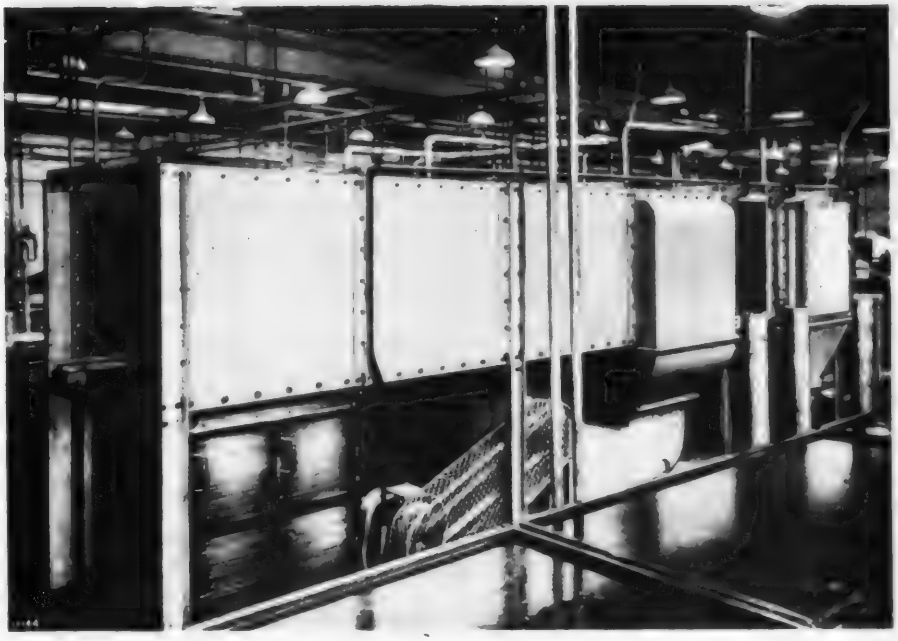

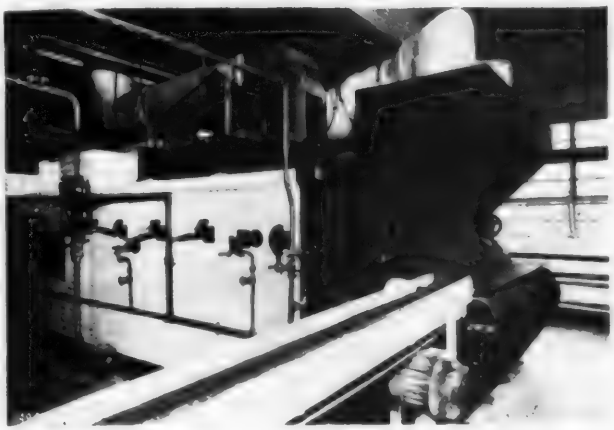

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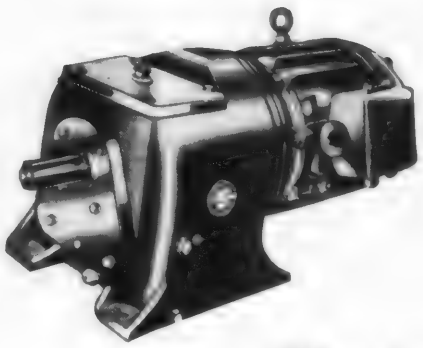

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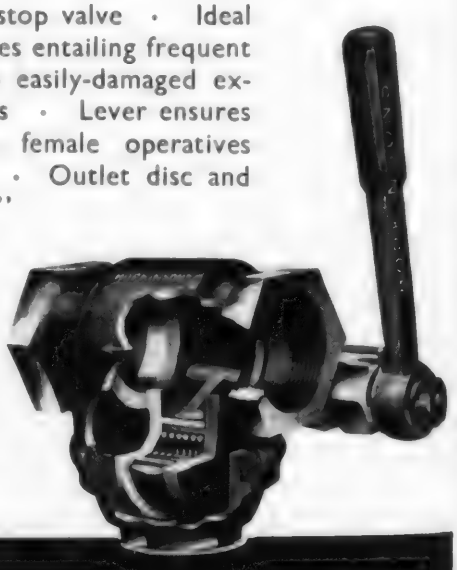

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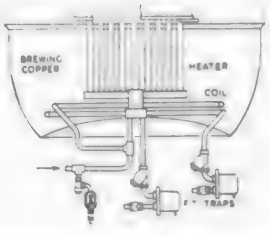

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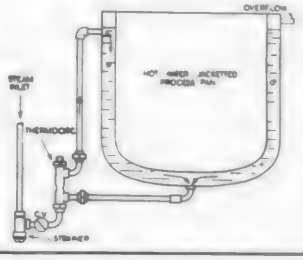

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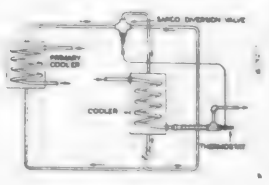

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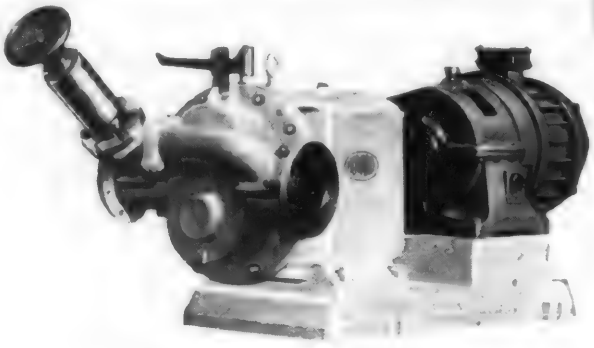

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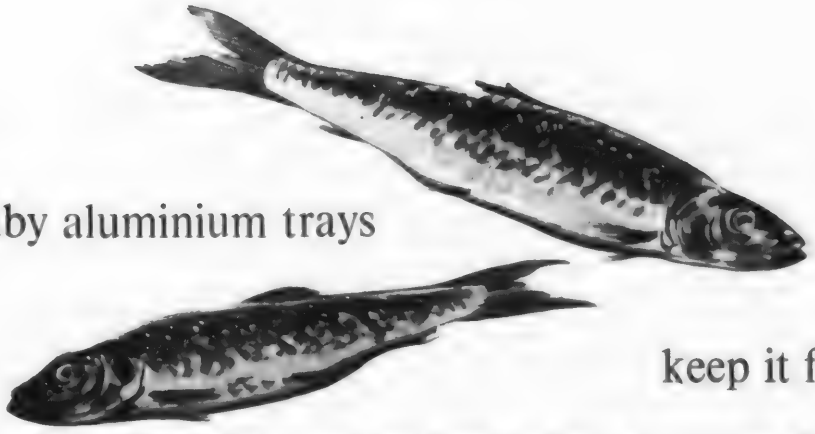

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FOOD MANUFACTURE

Vol. XXIX. No. 5 · Published Monthly · May 1, 1954

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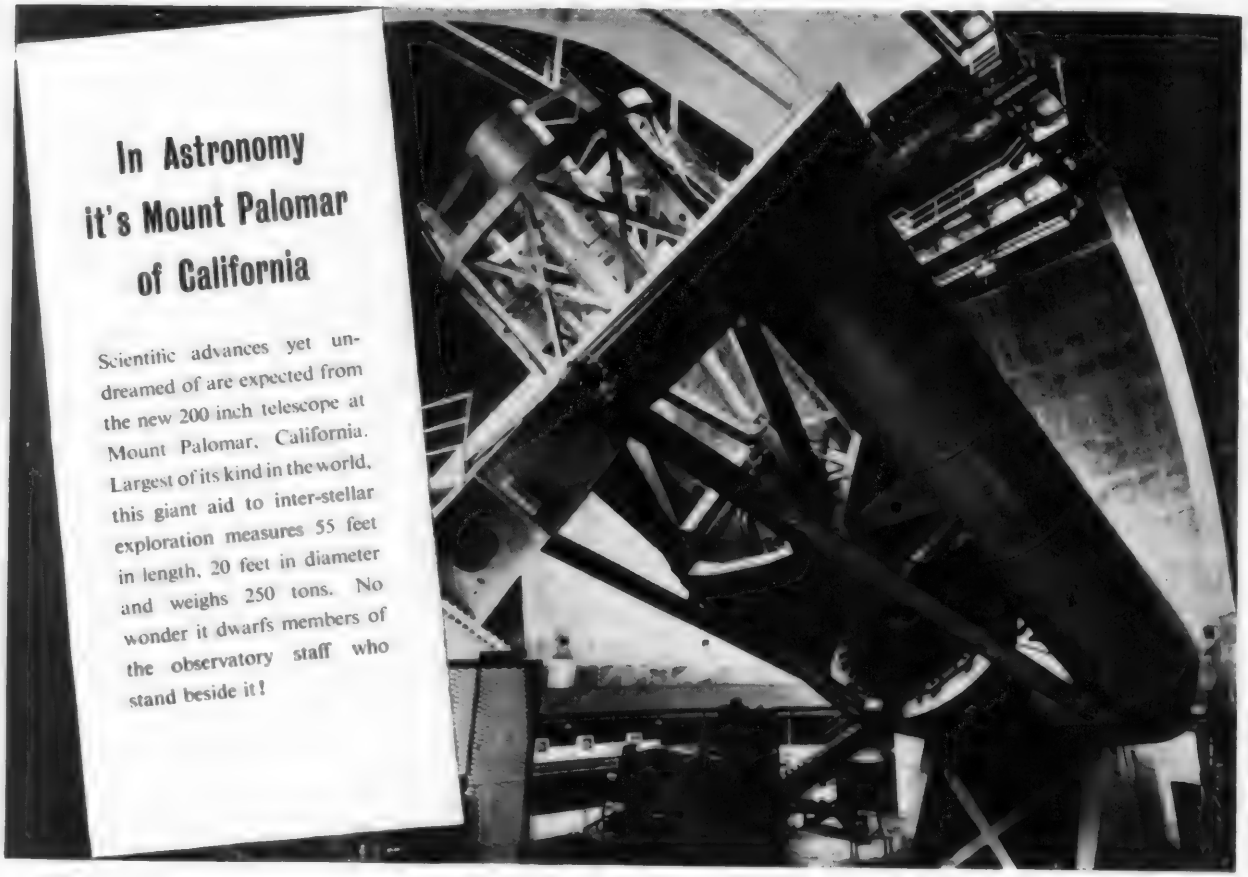

In Astronomy it's Mount Palomar of California

Scientific advances yet undreamed of are expected from the new 200 inch telescope at Mount Palomar, California. Largest of its kind in the world, this giant aid to inter-stellar exploration measures 55 feet in length, 20 feet in diameter and weighs 250 tons. No wonder it dwarfs members of the observatory staff who stand beside it!

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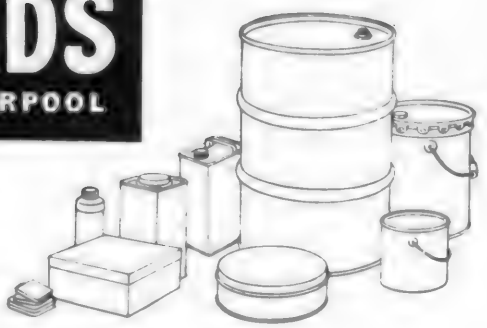

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FOOD MANUFACTURE

Vol. XXIX, No. 5 May 1, 1954

A Tastier Loaf?

CONTROVERSIES about bread, like the poor, are always with us. Prior to 1939, they were concerned with the relative merits of white bread and brown bread, but subsequently the opposing camps shifted ground, and by 1945 the issue had become long extraction flour *versus* white flour enriched with synthetic nutrients.

Agreement upon which was the better policy was not reached at the Conference on the Post-war Loaf, but there was unanimity upon the nutritional status which post-war bread should attain, whatever the authorised method of attainment might be. When the milling industry was decontrolled in September of last year, the Government brought into force the nutritional levels recommended by the Conference but, doubtless to avoid political repercussions, it refrained from rushing in where the Conference feared to tread, and permitted the miller to provide the prescribed nutrients either by using milling techniques which segregated them from the grain or by producing a flour of lower extraction and enriching it with synthetic nutrients.

This solution should satisfy both schools of thought; it permits those of the vitamins-natural-to-the-grain school who do not wish to confine themselves to wholemeal to obtain bread of good nutritive value which has not been "restored" by the miller, and it ensures that those who wish to have really white bread can exercise their preference without diminishing their intake of the token nutrients.

The opposing factions should now be at peace, because each can have the bread of its choice; that there is no detectable difference between the nutritional values of the two types of bread is shown by experiments carried out on children in Germany under the auspices of the Medical Research Council.

The dietary value of a food is not necessarily proportional to its nutritional value because it is dependent also upon the amount of the food that is consumed. To achieve the desired consumption, it must be palatable and attractive in appearance. This is particularly important in the case of bread as it can provide over 30 per cent. of the necessary calories and protein. Thus, any means that can be taken to raise the standard of poor bread (and there is still too much of this) and to maintain the standard of good bread will be of general benefit, for only when our consumption of bread is dictated by its palatability and other qualities shall we derive the maximum benefit from the nutrient specification recently imposed upon this food.

Food in Parliament

AMONG questions recently asked in Parliament about foods was one concerned with present and past consumption of chocolate and sugar confectionery. During the rationing period, the lowest figure was 2·9 oz. per head per week and in 1953, the year of derationing, it rose to 8·1 oz. When compared with the 1938 figure of 7 oz. per head, it is evident that the consumption of sweets is still on the increase.

Another question concerned agene—a subject which crops up regularly. In answer to a question, it was stated by the Minister of Food that the report of the Medical Research Council on the tests carried out on certain flour improvers would be considered by the appropriate sub-committee of the Inter-departmental Standing Committee on Medical and Nutritional Problems. The following methods of improvement have been investigated: agene, chlorine dioxide, the aeration process, ascorbic acid, and potassium bromate.

The latest figures for the take-up of rationed foods show that deliveries to the trade during the four weeks ended February 20, 1954, are estimated to have fallen short of entitlement. The entitlement includes, in addition to the rations of domestic consumers, the allowances to catering establishments and institutions, non-take-up rations not being isolated.

The most outstanding figures in this connexion were those for cheese which had not been taken up to the extent of 6·9 million tons, equivalent to 18·9 million rations, and margarine with 6·4 million tons, equivalent to 11·3 million rations. Meat was practically all taken up—a mere 0·9 million tons (or half a million rations) being left a-begging.

Cooking fat showed a minus figure of 1·6 million tons, with seven million rations relinquished. It will be interesting to see how the current extensive publicity for branded fats will affect this figure.

Trouble from Alfalfa

Two harmful compounds extracted from alfalfa have been found to retard the growth of chicks and cause digestive trouble in cattle, sheep, and goats. These were described in a paper read by Dr. C. Ray Thompson, of the Western Regional Research Laboratory, at the 125th national meeting of the American Chemical Society.

The substances were identified as plant saponins—complex lather-forming plant materials—one of which yielded a chemical which apparently has never before been reported as having been isolated.

The saponin materials, prepared by the author and his co-workers, Dr. E. D. Walter, G. R. Van Atta, and Dr. W. D. Maclay, inhibited the growth of chicks when fed to them at high levels, and were found to produce the typical symptoms of ruminant bloat in sheep, goats, and cows. He emphasised, however, that this may be only one of several factors causing bloat.

The purified material destroyed the red blood corpuscles of rat blood, diluted with normal saline solution, at slightly faster rates than did equal concentrations of a commercial saponin.

The studies of the alfalfa saponin indicated that it belonged to a class of saponins known as triterpinoids and not to the class of steroid saponins used to produce such hormones as cortisone.

Dr. Thompson announced that further work was in progress on the isolation of other saponins from alfalfa and other legumes, and on their physiological and pharmacological properties.

Fish Research in South Africa

A WIDE range of research, conducted at the Fishing Industry Research Institute, Cape Town, South Africa, is described in the sixth annual report of the director. Stickwater recovery, preservation of fish for canning, smoked oil for maasbanker and pilchard packs, canned fish regulations, freezing of fish, and seaweed utilisation were among the matters studied.

One item of special interest reported by the director, Dr. G. M. Dreosti, was concerned with investigational work on the production of fish flour from pilchard and maasbanker for human consumption. It was found possible, by several methods, to produce light coloured flours—although not quite so light as white fish flour—which were sufficiently free from odour and flavour to remain undetected when incorporated in brown bread to the extent of 4 per cent. of the weight of wheat flour used.

Another item of research concerned the use of malonic acid in the brining of fish.

Based upon the supposition that autolytic changes in fish flesh might involve the tricarboxylic acid cycle, an attempt to reduce autolysis was made by inhibiting this cycle. Malonic acid, which inhibits the succinic dehydrogenase system, was selected for this purpose as being relatively non-toxic, by comparison with other inhibitors of the cycle.

When added to brine for salting, malonic acid at concentrations of 0·5 per cent. and 0·1 per cent. prevented softening of the flesh of stockfish to a considerable extent, no soft fish being present when the acid was used at the higher level, and only one soft fish in a batch of 12 immersed in brine containing 0·1 per cent. malonic acid. This compared with five soft fish among the controls.

At the present retail price of pure malonic acid, the additional cost of brining would be approximately £9 10s. 0d. for five tons of fish when using the inhibitor at a concentration of 0·1 per cent. (w/v). This increase could probably be reduced by using a cruder preparation of the acid.

In toxicity studies albino rats of Wistar strain were fed *ad libitum* a modified Thomson diet containing malonic acid at levels of 0·2 per cent. and 0·5 per cent. At the former level, groups of rats were fed for 13, 30, and 40 days respectively without significant mortality or clinical symptoms. During these periods the rats continued to gain in weight normally, and at autopsy neither macroscopic nor histological changes were observed.

Rats fed on the diet containing 0·5 per cent. malonic acid for 13 days showed neither mortality, clinical symptoms, nor changes at *post mortem* examination.

When groups of rats were given single doses of malonic acid by stomach tube of (*a*) 0·5 g. each; (*b*) 0·25 g. each, and (*c*) 0·125 g. each, it was found that all rats of group (*a*) died within one hour; 50 per cent. of the rats of group (*b*) died within 3½ days, the remainder surviving until destroyed 30 days after administering the acid; and all rats of group (*c*) survived until destroyed.

Dose rate (*c*) corresponds approximately to a single dose of 37·5 g. malonic acid for a human subject. It seems reasonable to assume therefore that at the level used in fish brine no danger of mortality or histological changes exists.

Nitrates and Container Corrosion

AN investigation designed to collect information concerning the effect of *p*H, rather than total acidity, upon nitrate corrosion in canned foods has been carried out by N. H. Strodtz and R. E. Henry of the Research Division of the Continental Can Company (*Food Tech.*, **8**, 2, 93). The products selected for study were green beans, known to be a rapid de-tinner, and mustard and turnip greens which, although high in nitrates, were believed to show little, if any, of this effect.

As a result of these investigations, it was found that the corrosion potential of nitrate-containing

vegetables towards tinplate containers was influenced greatly by what appeared to be relatively small changes in *p*H. Such changes could conceivably result from abnormal growing conditions, or the combination of a leafy vegetable high in nitrate content with a low *p*H product, such as tomatoes. A change in canning technique, for example, the substitution of steam blanching for water blanching, could also affect the de-tinning rate of a product during storage.

The experimental evidence demonstrated that nitrates may be considered a potential de-tinning constituent in acid food products at *p*H levels as high as 5·4. However, nitrate corrosion may be almost completely inhibited by a mechanism which probably involves the formation of a protective film on the exposed tinplate surface, and such an inhibitory process is also likely to be sensitive to *p*H changes. In green beans, the corrosion process may be even more complex. Apparently, nitrate corrosion may be inhibited in the presence of de-tinning caused by another depolarising agent.

The Browning Reaction

A DISCUSSION on the browning reaction as it applies to food in general, the examination in detail of the various reactions involved, the conditions favouring or inhibiting their occurrence, and finally the presentation of an outline of the effects of browning upon various classes of food products, are contained in an admirable survey, written by Mr. J. I. Anderton, M.Sc., and published for members of The British Food Manufacturing Industries Research Association.

In his summary of the mechanism and effects of non-enzymic browning are contained the following points:

The reaction is liable to occur whenever foods containing proteins or amino acids and reducing sugars are heated or are stored for long periods without refrigeration.

The reaction may have beneficial or deleterious results, depending on the type of food concerned. The beneficial results include the production of a desirable flavour, odour, and colour in many baked and roasted products, and products of the reaction probably contribute to the particular individual taste of many foods.

Deleterious results include the production of stale and otherwise unpleasant tastes; the development of varying degrees of brown discoloration; the loss of protein solubility, leading to a deterioration in texture and the failure of dried foods to reconstitute properly; and an increased tendency for liquid foods to froth and foam.

The reaction is known to occur in several stages, the first of which appears to be a condensation between the amino group of the protein or amino acid and the reducing group of the sugar. This first reaction is not accompanied by the formation of any colour. However, if the heating or storing of the food is continued, it is followed by secondary changes, apparently involving the breakdown of sugar molecules, and certainly resulting in the production of a brown discoloration, the depth of which varies with the severity of heating or the duration of the storage.

From the nutritional angle, the adverse changes are more serious, it having been shown that the nutritive value of proteins may be seriously impaired by reactions with carbohydrates. The proteins appear to be rendered less digestible, owing to the formation between the protein and the carbohydrate of linkages not susceptible to enzymic hydrolysis, and there is evidence that several essential amino acids, and lysine in particular, are directly involved in the reaction. Losses ranging from 10 to 100 per cent. in the nutritive value of proteins, when heated with reducing sugars, are reported.

Member food manufacturers will find very great help in the elucidation of the problems occasioned by non-enzymic browning. As Dr. F. H. Banfield suggests in his foreword, food scientists and technologists will be able to read and understand the whole of the survey, but many others in the industry, while not interested in the whole field covered, will read with profit those sections which apply to their particular branch.

Flavour in Cheese

THAT there still remains a dark hinterland of food chemistry is evidenced by the almost complete lack of data relating to such things as the nature of flavours in certain foods. For instance, Jack C. Dacre (*Journal of the Science of Food and Agriculture*, **4**, 12, 604) describes an item of investigation in the contribution of amino acids to flavours in New Zealand cheese.

The results of a painstaking series of experiments do not support the suggestion that amino acids or amines, either singly or in admixture, have a direct connexion with the flavour of Cheddar cheese. It is understandable that protein degradation, formation of volatile acids and lactic acid, and production of tyramine should all correlate generally with the gradual appearance of that basic flavour which is typical of all hard-pressed acid cheeses, such as Cheddar and Cheshire, but this does not mean that any of the substances so far investigated are themselves responsible.

Apart from the findings of Harper and Swanson (so far unconfirmed) which were reported at the Stockholm International Dairy Congress in 1949 (*Proc. int. Dairy Congr.* [No. 12, Stockholm], 1949, **2**, 147), no clue has so far been discovered that points towards a solution of this complex problem.

The fact that certain bacteria, notably strains of lactobacilli, when present in the cheese cause an earlier and more intense development of the "cheesy" taste and odour suggests that bacterial enzymes are responsible for the formation of flavour substances. Hence the two most promising lines of attack would appear to be: (*a*) an attempt to isolate from mature Cheddar cheese the typical flavouring substances and to define them chemically; (*b*) an investigation of the metabolism of the flavour-producing lactobacilli in the hope of obtaining a clue to the possible nature of such substances.

Difficulties from the chemical aspect are enhanced by the probability that the flavouring substances are present to the extent of only a few parts per million of cheese. The author suggests that, in the event of failure to isolate and identify the unknown substances, it might be possible for progress to be achieved empirically by the discovery of some method of controlling cheese flavours without the knowledge of such substances.

Wood Sugar Revival?

THE successful and economical conversion of the cellulose of waste wood into sugars has been the subject of research over the past 40 years. The process failed completely in Germany during the first world war, but the Nazi Government were giving full support to the Bergius process even before 1939. The general verdict has been that wood sugar products are not economic commodities once a reasonable supply of cereal feedingstuffs is available. The Bergius process, having for its aim the complete chemical utilisation of waste wood, was handicapped by the high cost of corrosion caused by the necessity for the use of strong hydrochloric acid as the hydrolysing agent.

Post-war German adjustments of the Bergius process have so transformed it that it may be only a matter of time before economic production of wood sugar is possible. By the adoption of these modifications, strong acid is employed in only one section of the plant and then at a fairly low temperature. Molasses, which can be used as fodder or fermented to alcohol and high grade lignin, is also produced. It is claimed that whether waste wood or corn is used as raw material in the manufacture of dextrose, there is little difference between costs of production, and that even if the price of corn fell by 20 per cent., wood sugar could still compete.

The economic feasibility of the modern German process will probably vary with the conditions obtaining in different countries. While there is no large surplus of corn in Germany, there is an abundance of waste wood. In America the piling surplus of dollar-frozen cereals is bound to act as a deterrent upon any proposals to produce dextrose from wood instead of corn.

Wood hydrolysis processes have hitherto been dismissed as uneconomic for introduction into Britain, but our annual accumulation of waste wood is very high for a relatively thinly afforested country. Wood chip waste (not sawdust) must be used as the starting material for the new process. If further modifications could enable sawdust to be employed, its use as a raw material instead of corn would be imminent.

Eccentrics

SOME of the eccentric or absent-minded characteristics associated with some eminent men of science will be remembered this year. Paul Ehrlich's centenary, for example, reminds us not only of his pioneering of chemotherapy, but also of his habit of smoking two dozen black cigars a day, consuming gallons of mineral waters, and of sending himself a postcard to remind him to get a hair-cut, to attend a dinner, or not to forget his wife's birthday. Also born 100 years ago was Sir Charles Algernon Parsons, Fellow of the Royal Society and inventor of the turbine, who "proved" it impossible to make artificial diamonds. We like the biographical note concerning his stay at a country mansion; on coming down to breakfast late, he went to a side table to help himself from a huge dish containing scraps of bacon, bread, porridge, and other leavings intended for the household dogs. Parsons not only failed to notice anything strange but even relished the dish, for he went back for a second helping!

Recent references to strontium minerals bring to mind Richard Kirwan, the Irish chemist associated with strontium history. Although Kirwan became noted for his "Analysis of Mineral Waters" and as a weather prophet accepted by half the farmers in Ireland, his story as the "Nestor of English Chemistry" rivals fiction. At levees and in law courts he would wear his peculiar slouched hat designed to keep out colds. He kept a pet eagle and six large dogs, received his friends while reclining on a couch before a blazing fire even in summer, and subsisted on a diet of ham and milk until that last stage before he died from repeated efforts to "starve a cold."

Ever since Henry Cavendish turned his mansion into a chemical laboratory, had a special staircase built that he might never set eyes on maidservants, and after leaving a note ordering the inevitable leg of lamb for lunch, set to work on his chemical experimenting, such eccentric philosophers have captured the imagination and have bequeathed as legacy the popular fallacy concerning the absent-mindedness of all professors. Such generalisations remind us of the young girl who wrote in an essay: "All people are made alike. They are made of bones, flesh, and dinners. Only the dinners are different." Although she probably "had something," we feel that the dictum cannot be accepted without reservations!

An aerial view of Nabisco's new Chicago bakery.

Streamlined Cookie and Cracker Production

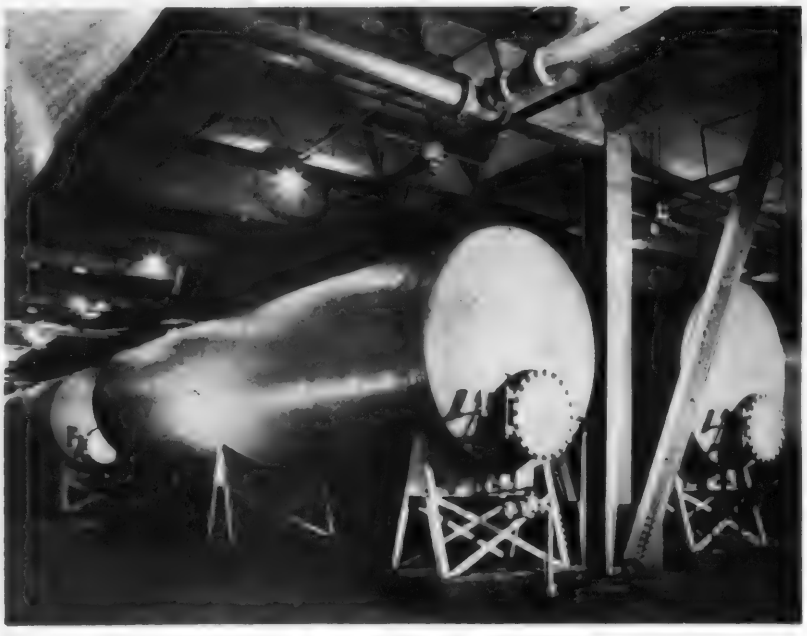
From the 12 band ovens of Nabisco's new Chicago bakery—an outstanding example of the scientific application of straight-line mass production methods—flows a tonnage of crackers and cookies claimed to be without parallel in the history of commercial baking. The completion of this bakery marks an important step in the company's programme for the modernisation of its plant. When it was launched in 1946, less than 30 per cent. of the company's biscuit and cracker production came from modern band ovens. With the addition of the 12 new ones in Chicago, about 80 per cent. of the cookies and crackers are now baked by this straight-line production technique.

THE National Biscuit Company traces its history back to 1792, when Mr. Theodore Pearson started the manufacture of the thick, hard "pilot cracker" or "ship bread" in Newburyport, Mass. In 1801, this was followed by the production of Josiah Bent's water cracker at Milton, Mass., and four years later by Artemus Kennedy's crackers at Arlington, Mass.

These three bakers were the pioneers of the American cracker baking industry and may be regarded as the initiators of the National Biscuit Company, since all three later became a part of that organisation, the actual use of the name "National Biscuit Company" dating back to 1898.

The company now has 15 biscuit and cracker bakeries, six specialty bakeries (one of which, for example, bakes only pretzels), and four cereal bakeries, the products from which are distributed through 250 selling branches. In

Control panel used for the pneumatic unloading and transfer of dry ingredients from freight cars to storage bins.



Storage tanks for the storage of raw materials other than flour.

addition, the company operates 17 bread bakeries located at strategic points from Burlington, Vermont, to Houston, Texas.

The New Chicago Bakery

The outstanding feature of the new Chicago bakery is the 131 ft. high tower, used primarily for the storage of raw materials, such as flour, sugar, shortenings, molasses, and syrups. The whole building is divided into three levels: tower area; mezzanine for mixing rooms, employee locker rooms, cafeteria, sugar wafer department, and packaging; and the main floor for warehousing, baking, additional packaging, icing, finished product shipping, offices, and other bakery functions, the whole comprising a total floor area of 868,000 sq. ft.

The latest practices have been utilised in the development of the colour scheme of the bakery interior. Smooth-faced buff tile walls combine with tinted cascade blue ceilings, green doors, and polished hard maple floors to produce a restful appearance; fluorescent lighting is used in all manufacturing areas.

To maintain ideal working conditions, large forced draught fans operate continuously, providing a complete change of air every four minutes throughout the entire bakery. Large roof fans exhaust all heated air.

The sanitation department, with a staff of 65, ensures the cleanliness of all plant. Built-in vacuum cleaning systems, provided with outlets throughout all warehousing, assembly, mixing, and baking areas to facilitate cleaning, keep the air free from dust and flour particles; electrically driven floor scrubbing machines and floor waxing machines are used for concrete and quarry tile flooring and throughout the office and locker room areas.

The plant maintains its own incinerator for refuse disposal, the fumes from which are water scrubbed to eliminate the presence of smoke, odours, or fly ash in the bakery.

Raw Materials

The huge production schedule and the rapid turnover of supplies combine to make the inflow of raw materials one of the big projects of the bakery. In a month of average production, over 200 freight cars of raw material are received and approximately 600 freight cars of finished products are despatched.

Some of the supplies on average monthly order for this bakery alone are:

	lb.
Flour	9,150,570
Sugar	2,167,000
Shortening	916,667
Salt	215,000
Chocolate and cocoa	167,700
Soda	74,300
Cheese	105,000
Eggs	33,300
Molasses	137,633
Yeast	6,000
Honey	38,000

Besides these bulkier items, a month's production calls for many other raw materials. Where possible, these come from the Midwest, but others, such as coconut, spices, leavening agents, corn starch, raisins, figs, and nuts, come from all over the world.

Part of the flour handling system.

Storage Accommodation

Car load lots of shortening arrive in special tank cars, each consisting of a steam jacketed stainless steel tank, which tempers the shortening when it is switched into the enclosed unloading rail dock. The shortening is pumped into one of 11 stainless steel storage tanks, each with a capacity of 9,900 gallons, installed in the tower area, where constantly controlled temperatures keep the shortening ready for piping to the mixers on the mezzanine floor.

From its own blending plant in New Orleans, the company transports molasses, invert sugar, and corn syrup in tank car load lots. On arrival at the bakery, they are pumped to any of the six stainless steel storage tanks, also in the tower area, and then piped to the mixing and icing departments.

In four large refrigerated storage rooms, each with controlled humidity and temperature, are stored such items as raisins, cheese, butter, nuts, chocolate, and coconut.

Sugar, delivered in car load lots of 80,000 lb. each, is taken up through pneumatic tubes to steel bins in the raw materials storage tower, a mechanical conveyor taking the sugar to the mixing machines as required. A separate pneumatic system carries sugar from the storage bins to smaller ones in the icing and sugar wafer departments for use in making syrups and icing.

The trough of the spindle mixer used for the production of cracker varieties has a capacity of approximately 1,500 lb. of dough.

Flour is handled in the same manner. It arrives from the company's own mill in Toledo, Ohio, in specially designed hopper cars held by the company under exclu-

A battery of 17 large mixing machines produces the dough for the large sweet goods line. The mixers employ power-driven paddles to prepare the dough for baking.

Specially designed dough trough dumping machine drops a sponge dough into the hopper on the floor below.

sive lease. The Toledo mill (the company has others at Carthage, Missouri, and Cheney, Washington) has a total storage capacity of 6,400,000 bushels of wheat and a daily grinding capacity of 2,200,000 lb. of flour, processing more than 12 million bushels of wheat annually.

On arrival at the bakery, the flour is unloaded from the cars into the pneumatic system and taken to any one of the 81 flour bins, each of which has a capacity of 125,000 lb., where it is stored according to type. Thermostatically controlled by heating units and air circulation, the temperature of the tower is maintained between 75° and 80°F. Flour blending equipment and sifters are installed on the lower floor of the tower directly above the mixing department.

Ritz Crackers are cut out and stamped from a continuous sheet of rolled dough. Dough left over after cutting is immediately returned to the hopper and re-used.

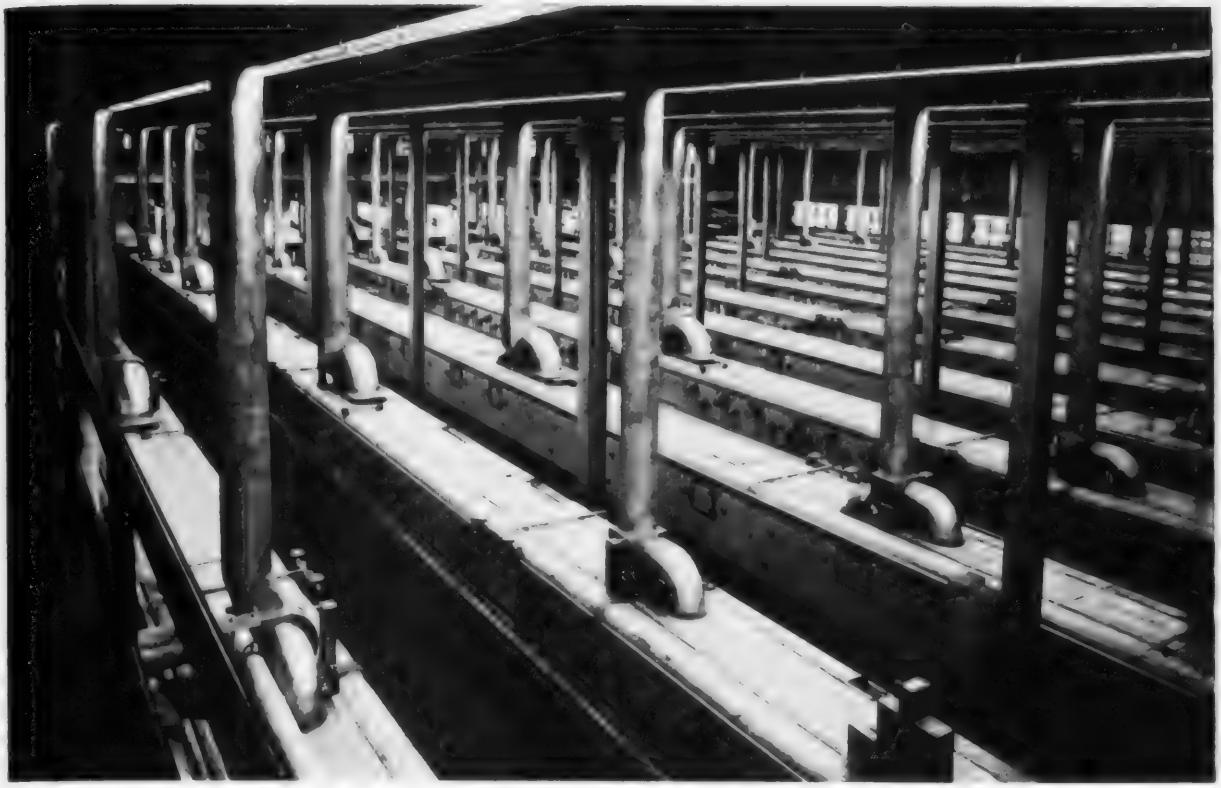
Baking Processes

The five general types of baked goods produced are crackers, cookies, cakes, sugar wafers, and Zwieback toast. Crackers include such varieties as Premium Saltine Crackers and Ritz Crackers. Cookies are plain sweet products, such as vanilla wafers, ginger snaps, and animal crackers. Cakes are cookies with embellishments, *e.g.* marshmallow or chocolate coverings, and sandwiches with cream fillings. The plant contains a complete sugar wafer bakery, with 13 modern sugar wafer machines.

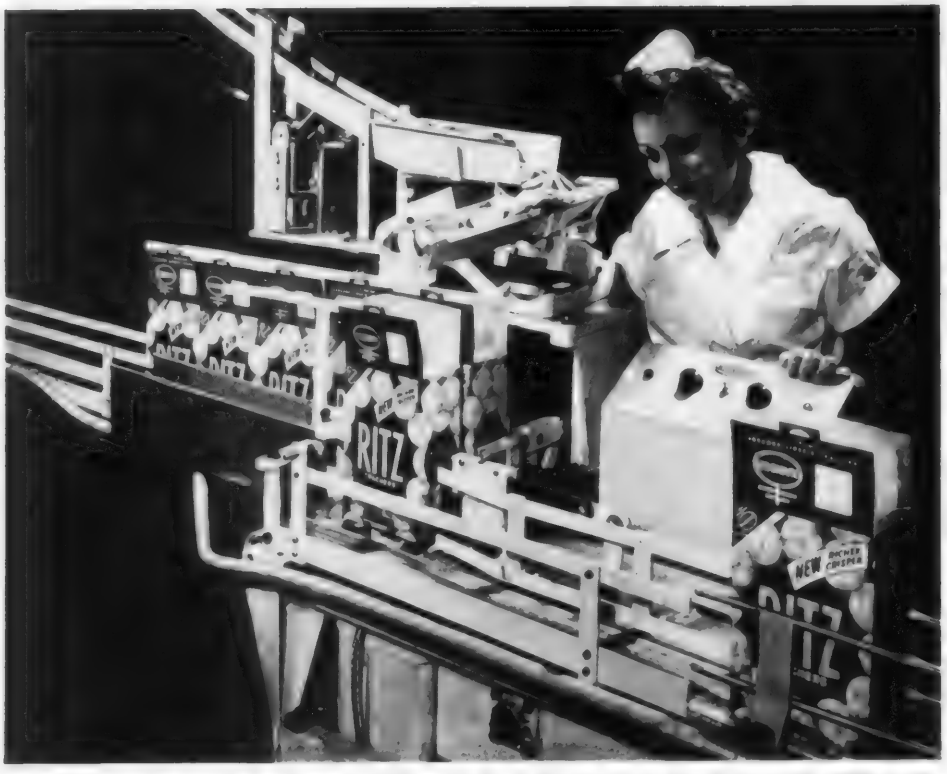
The manufacture of Zwieback toast is carried out as a separate baking operation. This product is made by a slow baking of loaves of special bread in a tray oven. After cooling, the loaves are sliced, the slices entering the band oven for a slow toasting. They emerge thoroughly dried and gently browned on both sides. The entire process, from the panning of the dough to the packing of the toast, is completely automatic.

Assembling and Mixing

Baking schedules, arranged well ahead of time, are fitted to meet the salesmen's orders. When the baking programme is set, raw material requirements are scheduled and all production steps are planned in advance.



Above: **Crackers travel the length of the 300 ft. ovens, each of which is capable of producing up to five million crackers in an eight-hour period.** *Below:* **Ritz crackers cascade from the delivery end of a band oven.**



Automatic weighing machines assure a full count of crackers in every package. After filling, the cartons pass by the weighing machines for a check, any underweight cartons receiving more crackers to make up to the correct weight.

Many of the ingredients—salt, soda, coconut, and cocoa—are assembled from storage rooms, and in some cases receive pretreatment before mixing with the other constituents. Flaked ice is frequently used in place of water to reduce dough temperatures. Correct temperatures for all ingredients are maintained in the mixing room and double-checked in the proof rooms.

Two principal methods of dough preparation are in use, each requiring its own special type of mixing equipment.

For sweet varieties, such as Old Fashion Ginger Snaps, "upright mixers" are used, the bakery containing a battery of 17 of these, in which sugar, water, shortening, milk, syrups, and other ingredients are creamed together, flour and leavenings are added, and the dough is mixed.

The other type of mixing equipment is the spindle mixer, used for cracker varieties. The ingredients are put into a trough mounted on wheels, each trough having a capacity of about 1,500 lb. of dough. The trough is locked in position, and the three spindles are lowered into it. Automatic timing devices control the exact number of spindle revolutions for each type of dough.

Twenty-four hours are required to prepare the dough for Premium Saltine Crackers, the first step being the incorporation of a certain percentage of the flour with yeast and water in the spindle mixer, after which the dough is allowed to rise in the proof room. At the end of the first proofing, the risen sponge is taken out, the remaining flour, shortening, salt and soda are added, the whole remixed, and set for a second proofing.

Shaping the Product

Dough is carried from the mixing room by conveyors to the rolling and cutting machines on the first floor, or oven level. Each type of dough receives its own special treatment as the big mass is rolled and pressed into thin continuous sheets, by a unique arrangement of steel rollers. The sheets then pass under the cutting and stamping machines. Those products with a salt topping, such as Ritz Crackers, receive a sprinkling of salt before the actual baking process begins.

After shaping, the cookies and crackers travel in rows on to the baking bands and into the streamlined travelling band ovens. All materials and building facilities are geared to the requirements of these 12 ovens. The "moving ovens" are actually an endless band of wire mesh or steel that traverses the 300 ft. enclosed length. Designed by Nabisco engineers, these ovens are the latest word in straight-line mass production. Gas burners extend across both top and bottom of the moving band, the heat being regulated in each zone as necessary, and the speed of the band adjusted to the baking recipe. For example, the rich Nabisco Vanilla Wafer spends seven minutes in transit, while the Premium Saltine Cracker travels the length of the oven in a little less than three minutes. During an eight-hour shift, the output of one oven will be 5,000,000 Premium Saltine Crackers.

When the products emerge from the oven, the biscuits and crackers move to a conveyor belt for delivery to the packing tables. Each item is carefully cooled to permit packaging at exactly the right temperature. This cooling process cannot be hurried, and is accomplished by regulating the speed of the long conveyor belts. Both crackers and cookies travel 600 ft. from cutting machine to packing department.

Cake Production

Cookies which are prepared for creamy fillings or coverings are called base cakes. After baking and cooling, the cakes are conveyed to the icing department, where marshmallow is deposited on a base cake, and the whole passed through the chocolate enrober for the production of the

Mallomars Chocolate Cake. Other machines insert cream fillings, add icings, or sprinkle coconut.

After marshmallow is deposited on certain base cakes, they travel on a cooling conveyor while becoming "set" for packing. The conveyor has 12 levels or rollers, each 45 ft. long. Trays of cakes traverse each level, travelling a journey of about 500 ft. in 30 minutes. After cooling, the cakes are packaged and ready for shipment.

Packaging Department

Over 25 million pounds of packaging materials are used yearly at the bakery, the company operating two box-making and printing and carton plants for the manufacture of boxboard and cartons, and a factory for printing the cartons, seals, and wrappers in the colours required for Nabisco packages.

Each packaging line in the two packing departments involves a series of forming machines, automatic weighers, and closing and wrapping machines. Baked goods enter the department on the cooler conveyor belts from which the products are taken and prepared for packing.

On one conveyor belt, the prepared cartons with wax paper lining reach the girl packers on one level; immediately below are two more belts, one bringing in the crackers or cookies stacked for packing, the other taking away the open carton after it has been filled. Most of the crackers and cookies are now packed automatically, going from the cooling conveyors to the wax wrapper machines, or directly from automatic filling machines into printed cartons lined with waxed paper.

The filled cartons move on conveyor belts from the filling to the wrapping process. Some boxes are prepared for wrapping by a machine which folds the wax paper lining and cardboard carton top. These boxes are then covered with a printed wrapper and sealed at either end. Both wrapped and printed cartons then proceed to the bundling machine which wraps a number together for shipping purposes. Finished goods are moved by belt conveyor to the shipping department, where they are placed on floor trucks and wheeled directly to freight cars or trailer trucks.

Electrically powered tractors, fork trucks, and pallets do the heavy work of handling raw and package materials, as well as the finished products. Fully equipped workshops have facilities for handling every type of plant maintenance problems.

Work of the Laboratory

The four-way task of the company's laboratory at New York headquarters consists of (i) packaging research; (ii) analytical and quality control of finished products and all materials used; (iii) research; and (iv) experimental baking.

Excellence of Working Conditions

Improved working conditions are a feature of the new Chicago bakery, all plants for the building taking into consideration the comfort, convenience, and protection of personnel. Included are air-conditioned offices, cafeteria seating 500, smoking and recreation rooms, dressing rooms, locker rooms, and showers. In the medical department, the full-time trained nurse treats accidents and minor illnesses, and free medical advice is given by an attending physician.

SOME SUPPLIERS OF EQUIPMENT

Asphalt tile floors and wood floors: *Austin Flooring Co.*
Boilers: *Babcock and Wilcox Co.*
Proof rooms: *C. T. Hogan and Co.*
Steel rolling doors and wood overhead doors: *Kinnear Manufacturing Co.*
Passenger lifts: *Otis Elevator Co.*
Terrazzo floors: *Rennen Terrazzo Mosaic Co.*
Kitchen and café equipment: *The Stearnes Co.*
Insulation, ovens, and piping: *Asbestos and Magnesia Co.*
Process piping: *Economy Plumbing and Heating Co.*
Process air conditioning controls: *Johnson Service Co.*
Conveyors: *Lamson Corporation; Samuel Olson Manufacturing Co.; Alvey Conveyor Manufacturing Co.*
Screw conveyors: *Link Belt Co.*
Zwieback oven and equipment: *Read Standard Corporation.*
Oven framework, pin trolley framework, and miscellaneous iron work: *Ripple Architectural Metals, Inc.*
Liquid level gauges: *Tri-Mont Instrument Co.*
Process equipment ventilation and air conditioning, enamelled sheets for ovens: *O. A. Wendt Co.*
Refrigeration: *York Corporation.*

Catering for Institutions

THE students following a course that will fit them eventually for positions of responsibility in institutional catering will find this book* essential as a foundation upon which to base their necessary subsequent practice. Apart from the student, it should also be useful as a reference book for practising caterers.

The scope of the book has been restricted to kitchens generally covered by the description "non-profit making," that is to say residential institutions, such as university halls of residence, college hostels, and canteens for establishments such as day schools and factories. Hospitals have also been included because the work in them is in many ways similar, although the food will be eaten in the wards and not in dining rooms.

The book is divided into four main parts: Planning the Kitchen, Equipment, Organisation, and Planning and Preparation of Meals. It is written in a very clear style, is copiously illustrated, and can be thoroughly recommended to those for whom it was written.

* *The Kitchen in Catering.* By Joan E. Walley, B.Sc.(H. & S.S.). Pp. 293. Constable. Price 24s.

The Leonard Hill Technical Group

Articles published in some of our associate journals in the Leonard Hill Technical Group this month include:

Building Materials Digest.—Stone for the Rebuilding of Cities.

Muck Shifter.—The Scope and Purpose of the Owen Falls Hydro-electric Power Scheme.

World Crops.—Progress in the Tea Industry in North East India; The Improvement of Ceylon Tea.

Petroleum.—Simple Corrosion Theory as an Aid to Materials Selection.

Paint Manufacture.—Paints for High Moisture Conditions.

Manufacturing Chemist.—Roussel's Cortisone Plant; Rumen Concentrates.

Corrosion Technology.—Paint *versus* Corrosion.

Ministry of Food

LATEST STATUTORY INSTRUMENTS

The list given below is the continuation of the list of Instruments published in "Food Manufacture," February 1, 1954, page 72.

No.	Date.	
	1953.	
		PRICE FIXATION
1860	Dec. 27.	Order amending the Imported Canned Fish (Maximum Prices) Order, 1950. Revokes S.I. 1952, No. 328.
	1954.	
1888	Jan. 1.	Order amending the Cheese Order, 1950. Revokes S.I. 1951, No. 728.
114	Feb. 7.	Order amending the Butter Order, 1951. Revokes S.I. 1953, No. 1513.
115	,, 7.	Order amending the Cheese Order, 1950. Revokes S.I. 1953, No. 1514.
264	Mar. 14.	Order amending the Ware Potatoes Order, 1953.
		CANNED FRUIT
1917	Jan. 1.	Order amending the Imported Canned Fruit Order, 1950. Revokes S.I. 1952, No. 329.
	1953.	
		DRIED FRUITS
1658	Dec. 1.	Order revoking the Dried Fruits Order, 1951, the Dried Fruits (Amendment No. 2) Order, 1952, and the Dried Fruits (Amendment) Order, 1953.
	1954.	
		EGGS
1816	Jan. 31.	Order amending the Eggs Order, 1953.
		FISH
1659	Jan. 1.	Order revoking the Fish (Returnable Containers) Order, 1950.
28	Jan. 18.	The White Fish Authority (Returnable Containers) Regulations Confirmatory Order, 1954.
		INSPECTION OF UNDERTAKINGS
	1953.	
1739	Dec. 6.	Order revoking the Food (Inspection of Undertakings) Order, 1943, and S.R. and O. 1943, No. 156.
	1954.	
		LABELLING
1889	Jan. 1.	Order amending the Labelling of Food Order, 1953.
		LICENSING
58	Jan. 24.	Order amending the Food (Licensing of Establishments) Order, 1948.
	1953.	
		MILK
1660	Dec. 2.	The Milk (Special Designations) (Specified Areas) (No. 2) Order, 1953.
1821	,, 20.	Order amending the Milk (Special Designation) (Pasteurised and Sterilised Milk) Regulations, 1949.
1876	Dec. 27.	Order amending the Milk and Dairies Regulations, 1949.
	1954.	
1862	Jan. 1.	The Milk (Special Designations) (Specified Areas) (Scotland) (No. 2) Order, 1953.
1863	,, 1.	The Milk (Special Designations) (Specified Areas (No. 3) Order, 1953.
282	Apr. 1.	The Milk (Special Designations) (Specified Areas) Order, 1954.
		OILS AND FATS
1846	Jan. 1.	Order amending the Oils and Fats (No. 2) Order, 1953.
	1953.	
		PRESERVATIVES
1859	Dec. 22.	Order amending the Public Health (Preservatives, etc., in Food) Regulations (Scotland), 1925. Revokes S.I. 1953, No. 1627.
		RATIONING
1861	Dec. 20.	Order amending the Fats and Cheese (Rationing) Order, 1953.
	1954.	
57	Jan. 24.	Order amending the Fats and Cheese (Rationing) Order, 1953. Revokes S.I. 1953, No. 1861.
74	,, 24.	Order amending the Food Rationing (General Provisions) Order, 1953.
135	Feb. 21.	Order amending the Fats and Cheese (Rationing) Order, 1953.
170	,, 21.	Order amending the Meat (Rationing) Order, 1953.
		SHIPS' STORES
1897	Jan. 1.	The Ships' Stores Order, 1953. Revokes S.I. 1950, No. 1462, and S.I. 1953, Nos. 550 and 1424.
169	Feb. 21.	Order amending the Ships' Stores (Charges) Order, 1952.
	1953.	
		SUGAR
1420	Sept. 27.	Order revoking the Invert Sugar Order, 1951, the Invert Sugar (Amendment) Order, 1952, the Sugar (Prices) Order, 1952, the Sugar (Prices) (Amendment No. 4) Order, 1952, the Sugar (Prices) (Amendment) Order, 1953, the Sugar (Prices) (Amendment No. 2) Order, 1953, the Sugar (Rationing) Order, 1953, and the Sugar (Rationing) (Amendment No. 2) Order, 1953.
		WASTE
1589	Nov. 5.	Order revoking the Waste of Food Order, 1940.

Recent Advances in Protein Nutrition

A. E. Bender, B.Sc., Ph.D., F.R.I.C.

At the turn of the century proteins occupied the centre of the nutritional stage, but were ousted to some extent by the vitamins, the study of which dominated the field of nutrition between the two wars. However, proteins have now regained the attention of the nutritionists. The author discusses the subject in the light of recent work.

THE fact that different proteins vary in nutritional value was clearly established 40 years ago by the classical experiments of Osborne and Mendel. From their work was derived the concept of good and mediocre, or first and second class proteins, later to be modified in view of the supplementation that occurs with mixtures of proteins.

It soon became clear, at least to the nutritionist if not to the farmer and the medical man, that the mere protein content of a food yielded little information as to its nutritive value and it was suggested by Blaxter[1] that human requirements should be expressed in terms of essential amino acids (EAA) rather than total protein.

This procedure raises two problems: 1. How much of the EAA does man require? 2. How can the availability of these requirements in food be assessed?

Human Requirements

The determination of the human requirement of the EAA dates from the discovery of threonine, the last of the EAA, by Rose 20 years ago.[2] It was first necessary to receive guidance from animal experiments before the more difficult experiments could be performed on man. After trial and error with all the known amino acids it was established that Val, Leu, Ileu, Thr, Met, Phe, Try, Lys, His, and Arg (partially) were essential for growth in the young rat. (The use of the first three letters as a symbol for each amino acid is most convenient.)[3]

The same type of experiment was then performed on human volunteers.[4] It was necessary to prepare sufficiently large quantities of the pure amino acids to feed to the subjects, and also to compile a diet which was deficient in protein, yet palatable. The volunteers were fed largely on wafers baked from corn starch, corn oil, clarified butterfat, and mineral salts, supplemented with synthetic vitamins. The experiment started in 1942 and took seven years, involving 42 male subjects.

They were fed a mixture of those amino acids shown to be essential to the growing rat, together with sufficient glycine and urea to bring the total nitrogen to 10 g. per day. The amino acids were omitted one at a time and nitrogen balance taken as the criterion of their essentiality. At the same time the amount of each amino acid was varied so that the minimum level at which nitrogen equilibrium was established could be determined.

All nine amino acids essential to the rat (excluding the partially essential Arg) were found to be essential for man with the exception of His. Another species difference was in the value of the optical isomers. In both man and the rat, D-Met is equivalent to the L-form; D-Phe is partially useable and the D forms of Val, Leu, Ileu, Thr, and Lys are valueless. Man, unlike the rat, cannot use D-Try.

From the same series of experiments the minimum levels of each amino acid necessary to maintain nitrogen balance were established. Following convention, although there is no real justification for this procedure, Rose suggested that the recommended level of each amino acid is double this minimum (Table 1).

In the same table are shown the intakes of EAA present in the 29·3 g. of whole milk which Bricker, Mitchell and Kinsman[5] found to be the minimum required for the maintenance of nitrogen balance. Egg protein, which has a biological value of near to 100, contains the EAA in proportion similar to that found by Rose. An apparent discrepancy exists in the case of Val, shown in the Table to be more than adequate in egg. On the contrary, Mitchell[6] showed that egg protein could be improved by the addition of Val, which should therefore be considered as the limiting amino acid. The apparent limitation of Met in egg compared with Rose's standards may not be significant because of the Met-sparing effect of Cys, and in addition Mitchell[6] failed to improve egg protein with Met supplements.

TABLE 1

MINIMUM DAILY REQUIREMENTS OF EAA (G)

	Rose.[4]	*Bricker et al.*[5]	*20 g. egg protein.*
Try ..	0·25	0·5	0·3
Phe ..	1·1	1·7	1·3
Lys ..	0·8	2·2	1·4
Thr ..	0·5	1·4	1·0
Val ..	0·8	1·9	1·5
Met ..	1·1	1·1	0·8
Leu ..	1·1	3·3	1·8
Ileu ..	0·7	1·8	1·6

Individual Variation

One important finding, which is probably true of many other nutrients, was that these minimum levels of amino acids varied with different individuals. Some amino acid minima were consistent from one subject to another; others showed up to 100 per cent. variation. These variations were not correlated with surface area or creatinine output, and it is not known whether partial synthesis or intestinal bacterial synthesis is involved. The figures quoted were the highest found.

On similar lines Johnston and McMillan[7] found that young women on a constant protein intake showed nitrogen retentions which varied widely from week to week.

Minimum Protein Requirements

What is not revealed by Rose's experiments is the minimum total nitrogen requirements. It is clear from known human diets that the total nitrogen intake of the volunteers of 10 g. per day, equivalent to 62·5 g. of protein, could be re-

duced without detriment. In the classical days of this discussion, Chittenden maintained nitrogen balance for long periods on 44 g. of protein, and Hindhede on 25 g. of protein per day. On the larger scale a recent FAO survey[8] shows that Indians live on only 44 g., Singalese on 39 g., and Indo-Chinese on 36 g. of protein daily.

Non-Protein Moiety

The minimum level of dietary protein is affected by the non-protein fraction of the diet, in particular its calorie content. Recent findings by Beattie[9] on Dutch civilians showed that the lowest nitrogen intake required to maintain equilibrium was 0·17 g. nitrogen per kg. body weight per day, equivalent to 74 g. of protein, while Baldwin and Berg[10] achieved balance in adult man on 44 g. of protein per day or 0·10 g. nitrogen per kg. The discrepancy is due to the different ratios of non-protein to protein calories in the two series of observations.

Maintenance of Nitrogen Balance

Rose showed that the calorie intake must be raised above a certain minimum to maintain nitrogen balance.[1] Thus at 35 Calories per kg. body weight a mixture of EAA failed to maintain nitrogen balance, but balance was achieved when the calorie intake was raised to 40 per kg. With whole protein, however, nitrogen balance became positive at 35 Calories per kg. This difference between protein and amino acid mixture is not explained. Beattie[9] pointed out that Chittenden achieved balance on an intake of 0·1 g. nitrogen per day by feeding 11 parts of non-protein to protein calories, whereas the Dutch civilians required 0·17 g. nitrogen per kg. because their ratio was only 5 to 1.

According to Rose's figure, an intake of 35 Calories per kg., or 2,450 for the average 70 kg. man, is inadequate at minimal nitrogen intake when amino acids are fed, although adequate with whole protein. This may mean that whole populations, which at first sight appear to be receiving adequate or marginal protein supplies, may, because of the low caloric intake, not be in positive nitrogen balance. For example, the Indians, who consume at 44 g. no less protein than Chittenden found adequate, receive only 1,700 Calories. The Chinese, whose diet might appear adequate at 63 g. of protein, are possibly underfed from the protein view-point because the calorie intake is only 2,000 per day.[8]

Another View of Protein Requirements

Set against all these minimum figures is a claim from Kraut and Müller[11] that one gram of protein per kg. per day is inadequate. Two undernourished men, weighing 65 and 52 kg. respectively, were fed an abundant diet restricted in protein to 55 g. per day. Positive nitrogen balance was achieved but after four weeks there was no increase in muscular strength. At 110 g. of protein daily, however, they showed such increase. The finding was confirmed by reducing the protein level back to 1 g. per kg. when the nitrogen balance remained positive but muscular strength diminished.

An insufficient number of experiments of this nature have been carried out and it is not known how important is the factor of individual variation, but it is clear that nitrogen balance cannot be the only criterion of adequate protein nutrition.

Protein Stores

Of possible value in estimating protein requirements is a method recently introduced by Harroun, Smyth, and Levy[12] whereby the protein stores of the body can be measured. The plasma volume, total serum protein, albumen, and globulin are determined before, and 30 minutes after, infusion with one litre of physiological saline. The protein stores, if any, migrate into the circulatory system; if they are very low, protein leaves the circulation. In "normal" persons the increase in plasma volume is 440 ml., and is reduced to half this in protein deficiency; total circulating proteins increase by 14 g. in the normal subject, and decrease by this amount in deficiency conditions.

The change from undernutrition to adequacy was demonstrated in a patient who was measured before treatment, after 21 days' feeding when body weight was increased by 2 lb., and after 64 days' feeding when there was an increase of 14 lb. The plasma volume change improved from −98 to +400, while the total proteins improved from −18·0 to +5·7.

This experiment emphasises the slowness of recovery from protein deficiency states and underlines the American Army recommendation[13] that seriously sick and wounded soldiers should receive 150 g. of protein daily.

Quality of Proteins

Side by side with the question of the optimum requirements of proteins and amino acids, is that of the availability of these materials in foodstuffs. It might be expected that a chemical analysis of a protein food would be sufficient to show whether the required amino acids were present in the required quantities. Indeed Mitchell and Block[14] have proposed a method whereby this can be done. As egg is nearly a perfect protein with a biological value of 95, this is taken as containing the optimum ratio of EAA. Where the amino acid content of the test protein is known, the limiting amino acid, expressed as a percentage of that amino acid contained in egg, is the chemical score. This figure in many cases corresponds well with the B.V. as measured biologically.

Drawbacks of Chemical Analysis

Considering the drawbacks to the method the agreement is surprisingly good. Theoretically chemical analysis should not be expected to correlate well with biological value for several reasons:

1. Chemical or microbiological analysis reveals the amino acids which are present, but not necessarily available. For example, wool would appear chemically to be a useful protein, but it is nutritionally of no value to any species other than the clothes-moth larva.

2. Heated or stored proteins undergo reactions (the Maillard reaction) between sugars and certain of the amino acids, notably Lys, Met, and His. These sugar-protein linkages in some cases are partially hydrolysed by acid but not by the digestive enzymes, and

the proteins to that extent have a lower nutritional value than chemical analysis reveals.[15] In rare cases, notably with soybean protein, nutritive value is increased by heat treatment.

3. Another difficulty of, as yet, unknown significance is the relative rate of release of the amino acids from the proteins during digestion. It appears from the work of Geiger[16] that all the EAA must be presented simultaneously to the tissues for protein synthesis to occur. Little, if any, storage exists. If five of the EAA are fed one hour apart from the other five, growth is impaired, and even if the amino acids are separated into two food pots from which the rat is feeding, growth is somewhat inferior to that achieved by a mixture of all 10 amino acids.

Absorption of Amino Acids

Associated with this question of the rate of liberation of the amino acids is that of their rate of absorption, as it has recently been shown that in the small intestine of the rat the presence of certain amino acids interferes with the absorption of others. It might therefore be possible to find two proteins of identical total chemical composition, which differ in food value because of different rates of liberation and absorption of their constituent amino acids.

The significance of this effect in human nutrition is not yet apparent but recent experiments of Denton and Elvehjem[17] yield some information. These authors hydrolysed three proteins, beef, casein, and zein, enzymically *in vitro*, and measured the rates of liberation of the amino acids. Considerable differences were shown by the various proteins. Three-quarters of the Arg was liberated from all three proteins by the pepsin alone and little more by pancreatic and duodenal enzymes; half the Phe of beef was released by pepsin but almost none of that of zein. All three proteins yielded up only half their His even after 24 hours, while nearly all the Met of beef but only half the Met of casein and zein were liberated in this time. Try was liberated from zein at a late stage, none after four hours, 50 per cent. in 10 hours, and 100 per cent. in 24 hours.

While these *in vitro* experiments, where the products of hydrolysis accumulate, cannot be compared with *in vivo* conditions where the amino acids are continually removed into the blood stream, they do emphasise that different proteins release their amino acids at different rates so that the pattern presented to the tissues for synthetic purposes must differ considerably.

Availability of Lysine

A different approach was made by Guthneck, Bennett, and Schweigert[18] who used the weight-regain of protein-depleted rats to measure the availability of Lys. Casein showed 76 per cent. of its Lys utilised, 7 per cent. excreted, and only 16 per cent. unaccounted for. Denton and Elvehjem[17] found that after three hours peptic and one hour pancreatic digestion casein liberated only 37 per cent. of its Lys. If this rate of release of Lys were too slow to permit its use in protein synthesis, the unused portion would be oxidised and give an appreciable percentage unaccounted for in Guthneck's method. These results emphasise that the significance of the rates of release of amino acids in nutrition is unknown.

All these drawbacks might be expected to detract from the chemical score method of forecasting biological values, even if it is assumed that the amino acid composition can be determined with precision. That this assumption is unjustified is startlingly revealed in a large scale co-operative assay recently completed by the Rutgers University Bureau of Biological Research.[19]

Rutgers University Experiment

Twenty-five laboratories co-operated in a four-year project, lasting from 1946 to 1950. Six selected proteins: whole defatted dried egg, dried egg albumen, casein, defatted beef muscle, partially defatted peanut flour, and wheat germ gluten meal, were analysed for their amino acid content by several methods and their nutritive value determined by several methods in various animal species.

For amino acid analysis hydrolysates of the proteins were prepared centrally and distributed to the participating laboratories and *a mixture of eleven synthetic amino acids was provided for standardisation purposes*. In addition each laboratory hydrolysed the proteins themselves before analysis.

Extremely large variations in accuracy were shown by the different laboratories. The answers for synthetic cysteine varied from +71·2 to −22·7 per cent. of the true answer, whereas for Met the answer varied only between −1·1 per cent. and +8·8 per cent. of the true answer. Of 14 different amino acids only five were estimated within ± 10 per cent. of the true answer; four more within ±20 per cent.; the remainder were far out.

If it is borne in mind that these analyses were carried out by workers highly skilled in their techniques, using methods in many cases originated by themselves, and aware of the special importance of the experiments, then it would appear that very few amino acids can be estimated with any accuracy. The results are akin to the appalling results reported by Wootton and King[20] who showed that in simple routine estimations the blood constituents as daily carried out by skilled technicians, variations of up to 400 per cent. resulted.

Protein Hydrolysates

Estimations of the amino acid content of the referee protein hydrolysates showed even greater variations. Some determinations showed "good" agreement, *e.g.* Arg in casein varied between 3·1 and 3·9 per cent (10 laboratories); His in peanut 1·1 to 1·6 per cent. (10 laboratories); His in wheat gluten 1·0 to 1·8 per cent. (10 laboratories); Leu in peanut 4·1 to 4·8 per cent. (10 laboratories). Others showed very poor agreement, *e.g.* Arg in gluten 2·5 to 4·7 per cent. (10 laboratories); Cys in peanut 0·4 to 1·2 per cent. (five laboratories); Cys in gluten 1·1 to 3·6 per cent. (five laboratories); Leu in gluten 4·4 to 10·0 per cent. (10 laboratories); Try in egg albumen 0·2 to 1·3 per cent. (10 laboratories).

The analyses of the proteins hydrolysed in each laboratory

were no worse than the referee hydrolysates, indicating that errors arising from differences in technique of hydrolysis were negligible as compared with other sources of error.

So it would appear that it is extremely difficult to measure the amino acid content of proteins, even for the expert. It is therefore even more surprising that the "chemical scores" of Mitchell and Block[14] bear so good a correlation with biological values. It certainly means that chemical score alone, unsupported by biological evaluation, is a very uncertain means of forecasting the nutritive value of any protein.

In view of this unhappy chemical outlook, biological evaluation, notoriously variable, could hardly be worse. In practice it is better.

Biological Assay of Proteins

The classical procedure for the determination of B.V. of proteins is that of Thomas and Mitchell, and the results show good agreement between different laboratories so that in most cases the B.V. of a protein can be stated with a fair degree of precision. The drawback to the method is the arduous nature of the determination; the assay of a group of three proteins requires seven weeks and involves 120 duplicate estimations of the nitrogen content of urine and of faeces. This drawback has been largely overcome by a recent modification introduced by Bender and Miller.[21] Two similar groups of rats are fed test protein and non-protein diets respectively, and after 10 days they are killed and the carcasses analysed for nitrogen. The difference between the carcass nitrogen of the two groups, divided by the nitrogen intake gives values for Net Protein Utilisation (B.V. × Digestibility) which agree closely with those determined by the full Mitchell procedure.

Development of Shorter Method

A further shortening of the process was achieved by the finding that the nitrogen content of the rat is related to the water content and varies only with age, so that the carcass nitrogen analyses can be substituted by a simple water determination. By this method seven proteins can be measured in 10 days and no nitrogen estimations on urine and faeces are involved. The results measured on a wide variety of proteins agree with the literature figures determined by the lengthier procedure.

This method yields not only the true biological usefulness of a protein as contrasted with chemical assay, but is much more rapid than a complete set of amino acid determinations.

Microbiological Assay

A novel estimation of the B.V. of whole unhydrolysed proteins was introduced by Rockland and Dunn[22, 23] using the protozoan *Tetrahymena geleii*. The amino acid requirements of this organism approximate to those of mammals and its multiplication depends upon the B.V. of the protein supplied. The results of this microbiological assay agree well with those obtained by the more usual methods on rats.

Proteins and Enzymes

A new field that cannot be omitted from a review of recent work in protein nutrition is the inter-relationship between dietary proteins and tissue enzymes.[24-27] As enzymes are proteins a deficiency of protein in the diet should affect enzyme levels. This has been found to be true for a large number of enzymes. Some, however, disappear more rapidly than the protein deficiency warrants. If the enzyme content of the tissue is measured in relation to its protein content, then in some cases the enzyme content falls. For example, in one experiment compared with a 44 per cent. loss in total liver protein during protein starvation, liver arginase fell by 70 per cent., rhodanese by 65 per cent., adenosine triphosphatase by 50 per cent. Catalase, alkaline phosphatase, and cathepsin decreased at the same rate as liver protein. In all cases, except those of amino acid oxidase and transaminase, re-feeding restores the enzymes to their initial levels: in these two cases the damage appears to be irreversible.[27]

The level of liver xanthine oxidase is more closely related to dietary protein than most of the other enzymes. At dietary levels below 8 per cent. this enzyme disappears from the rat liver in a few weeks.[28] Its formation appears to require the presence of Met because weanling rats on purified diets fail to develop the enzyme unless this amino acid is present in the diet. The procedure has been suggested as a method of estimation of Met.

New Amino Acids

The widespread application of paper partition chromatography has made possible the detection of all the amino acids present in protein hydrolysates and biological fluids. New amino acids are constantly being identified, mostly in bacterial protein or free in higher organisms, *e.g.* α-ε diaminopimelic acid in *Coryne bacterium diphtheriae*,[29] γ-amino-butyric acid in various biological fluids,[30] hydroxylysine in calf embryo muscle,[31] β-amino-isobutyric acid in normal human urine,[32] and γ-methylene glutamic acid in the groundnut.[33] None of these appears to be of nutritional interest.

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(*Concluded on page* 197)

Gyratory Sieving of Powdery Materials

Justin Hurst

Managing Director, Russell Constructions Ltd.

The production of synthetic materials, which form the basis of the innumerable commodities essential to the needs of modern life, constitutes an ever-increasing demand upon the ingenuity of the engineer-designer who devises the machinery required for their manufacture. An important part of the operation is that of sieving ; in common with others, its speeding up was an obvious necessity. This article discusses how this may be achieved.

THE familiar sieving operation consists of the separation of the particles of a powder by means of a wire mesh sieve. The finer particles pass through the mesh, leaving the larger ones on the sieve.

The shaker screen performs this function by applying to the mesh surface a reciprocating movement which causes the material to bounce about upon its surface, a system which has grave defects. In order that the maximum amount of powder should pass continuously through the mesh apertures, the material should be maintained in close proximity to the screen surface and not suspended during part of the time in mid-air, as is the case with bouncing particles. Moreover, these bouncing particles will lodge in the mesh apertures, through which they cannot quite penetrate, and be followed by other ones which hammer them firmly home, causing the blinding or clogging of the screen. With certain materials, total blinding will be very rapid, making the screen unworkable until the mesh has been cleaned, oft-times involving the dismantling of the machine.

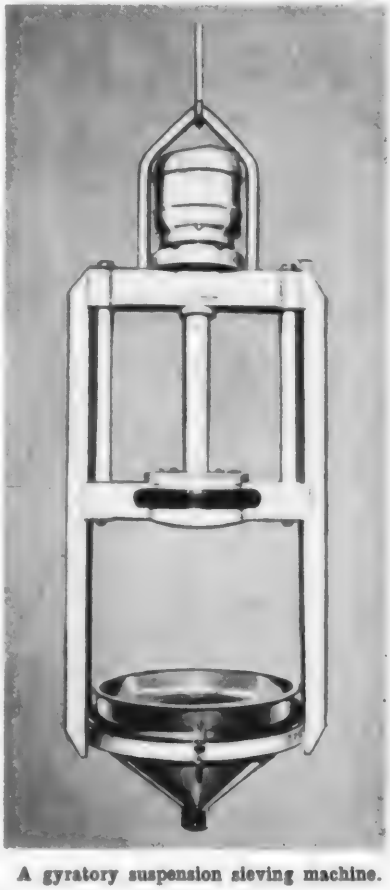
Development of Gyratory Sieving

Research upon this subject culminated in the creation of the gyratory sieving machine by which the screen surface is impelled to move in such a manner that, while not itself rotating, any point upon the mesh surface describes a circular orbit. Such a movement was brought about by attaching the screen rigidly to an out-of-balance flywheel, rotating in a horizontal plane, the whole assembly being freely suspended from its vertical axis.

With the flywheel rotating at 960 r.p.m., 1,050 lb. gyratory force was generated at the screen surface, the amplitude of gyration (*i.e.* the diameter of the circle described by each point of the screen) amounting to $\frac{1}{16}$ in., about $\frac{1}{3}$ h.p. being required to produce this effect.

When these machines were put into operation it was found that their efficiency transcended all past experience in sieving technique, the comparative throughputs amounting to 14 to 18 times as great as those obtained on a shaker screen, while mesh blinding and clogging had been virtually eliminated.

A study of the particle movement showed that this was due to the translatory motion imparted to the particles rotating on the radial axis, which caused them to roll round the mesh in concentric orbits, maintaining close contact with the screen surface, so that all fine material readily passed through the mesh; any oversize particle, even if momentarily lodging in an aperture too small for it to penetrate, immediately rolled out again.



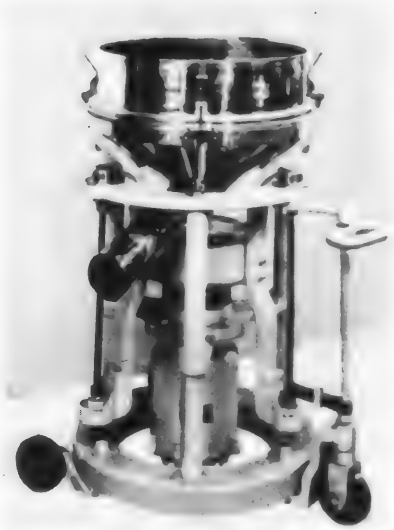
A gyratory suspension sieving machine.

Causes of Turbulence

A secondary phase of rotation of the particles caused the whole mass of particulate material to precess in an annular manner, turning over and over on the mesh surface with the effect that, no matter how deep the material upon the screen, each and every particle was ultimately presented to the mesh surface. In performing this annular movement, the smaller particles reacted with much greater energy than did the larger ones, causing the larger elements of the material to tend to remain at the top of the mass, thus keeping the screen surface clear of oversize particles. At this stage of the experiments, some other factor in the operation of the machine was responsible for the powerful turbulence which was generated in the mass of moving particles during their orbital movement on the circular screen.

Further study showed that this turbulence was brought about by a vibration couple—two members vibrating at different frequencies, reacting upon a common element, in this case the sieving screen.

In the suspension machine, the rigid flywheel housing will vibrate at flywheel speed (960 cycles per minute) but not so the channel members which, owing to their inherent elasticity, will take up a



The mobile gyratory stand model sieving and straining machine.

vibration mode of their own, and it is the effect of these two superimposed vibrated frequencies applied to the sieving surface which assists so largely in promoting the phenomenally high throughputs attained by this type of machine, although at the moment the theoretical explanation for this is not properly understood.

As the trials upon the suspension machine proceeded, it became evident that higher speeds of gyration and increased magnitude of imbalance would produce improved sieving efficiency, but that this type of construction could not be built to withstand, with safety, gyratory forces much in excess of 1,000 lb. Furthermore, the fact that the machine could be used only in establishments where overhead supporting gear was available, proved to be a serious limitation to its usefulness.

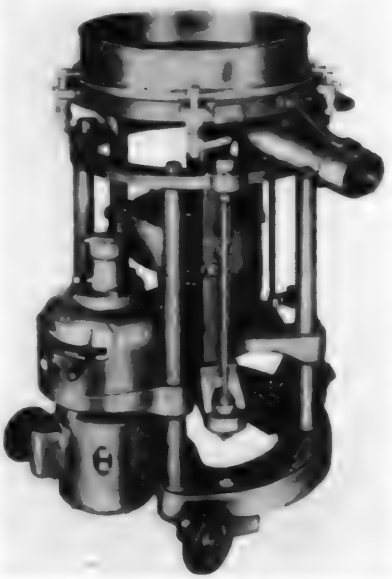
Gyratory Stand Model

As a result of the data already obtained, there was evolved the gyratory stand model in which the vibrating elements were suspended in an upstanding frame, mounted on trolley wheels. A $\frac{2}{3}$ h.p. electric motor running at 1,450 r.p.m. supplied the power and the out-of-balance flywheel was designed to generate a maximum of 2,060 lb. gyratory force. The electric motor formed part of the static frame, power being transmitted to the vibrating assembly by means of a special form of flexible coupling.

In the construction of the stand model, a number of perplexing problems had to be solved, among which was the method to be employed for the suspension of the vibrating assembly in the static frame.

A design was eventually evolved in which the suspension element took the form of a steel rod of predetermined section, mounted at each end in a compressed rubber bush—an arrangement proving entirely successful.

The stand model, which generated nearly double the gyratory force of the suspension unit, yielded throughputs of the order of 14 to 18 times as great as those obtainable from a shaker screen of comparable mesh area.



The variable speed machine yields phenomenal outputs through ultra-fine meshes.

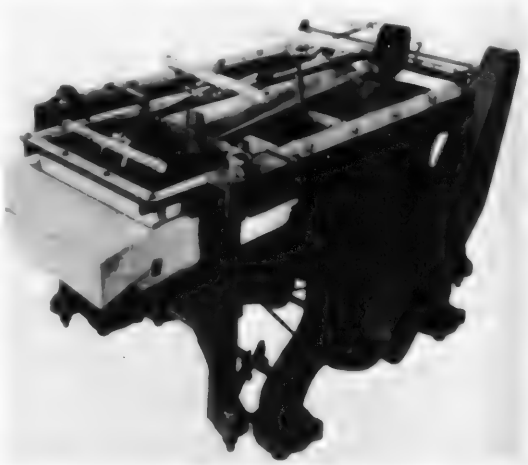
Having established that sieving efficiency was dependent upon the amount of gyratory force operating at the screen surface, a machine, capable of generating 13,000 lb. out-of-balance force, was constructed. This unit gave phenomenal outputs, amounting in some cases to 10 times as great as those obtained from the stand model; this has since become the standard equipment employed where large outputs through ultra-fine mesh screens are called for.

Liquid Straining Processes

In the adaptation of the gyratory machine to liquid straining processes, a separator unit has been evolved which, with a mesh area of only 6½ sq. ft., can strain liquid or semi-liquid media through a 120 mesh screen at the rate of 20,000 gallons per hour.

All these machines utilised as their screening element the ordinary circular sieve, a circumstance which postulated limitations upon their scope of function since, with a circular screen, sieving can be carried out only as a batch process. In an attempt to obtain continuous action, the use of a sloping rectangular screen, fitted to a gyratory machine, was attempted, but this proved to be only a partial solution of the problem; owing to the uneven distribution of the gyratory forces over the rectangular screen surface, the particles were impelled to deviate from their circular orbits, causing void spots to appear on some parts of the mesh surface and inordinate blinding to occur in others.

The problem at issue thus resolved itself into an investigation of means for producing a spiral progression of the particulate matter in a device embodying only discs and/or annuli in its construction. These investigations led to the production of the Cascade sieving machine. In this,



The separator machine for high speed continuous straining of liquids and semi-liquids.

the sieving operation takes place through three superimposed circular screens, the upper two screens being mounted upon curved pans which discharge through centrally disposed tubes. The bottom screen is fixed to a pan which carries the main outlet spout.

Cascade Sieving Machine

The two lower screen surfaces have central ringed openings fitted with sealing gaskets which register with the above located tubes of the mesh pans, the top mesh screen being fitted with a baffle plate at its centre.

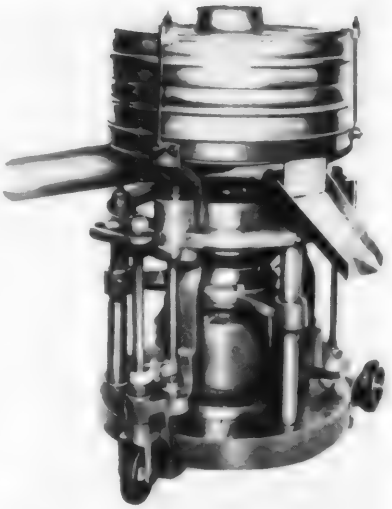
Disposed under the two top mesh pans are located the transfer pans of larger diameter, pierced with a central opening 2 in. larger in diameter than the discharge tubes which pass through them, there being about $\frac{7}{8}$ in. space between the transfer and mesh pans. The bottom screen surface is surrounded by an annular gutter, fitted with an outlet orifice.

The envelope of this assembly is built up of supporting rims which, together with the lid, interlock to form a dust-tight assembly.

In operation, the material, introduced through the central output orifice, impinges upon the baffle plate in the centre of the top screen. The gyratory movement of the machine impels the particulate matter to radiate outwards in a curved path, while a certain portion of the fines will pass through the mesh, and find its way *via* the central tubes to the main discharge outlet.

Meanwhile, the bulk of the material will pass over the edge of the circular screen and fall on to the outer edge of the transfer funnel. This latter has a sloping curved surface, so that the particulate mass, still retaining its curved path of travel, will precess towards the centre of the machine, thus being fed to the centre of the nether screen surface over which the particles will again radiate outwards. The same series of operations are repeated upon this and the bottom screen.

By the time the material has arrived at the outer edge of the bottom screen surface, virtually all the finer elements will have passed through the mesh aperture and been evacuated *via* the main discharge outlet, so that only oversize particles will be collected by the gutter which surrounds the bottom screen. This coarse material passes off through a reject outlet in the gutter.



The Cascade sieving machine gives continuous rejection of oversize and complete freedom from blinding.

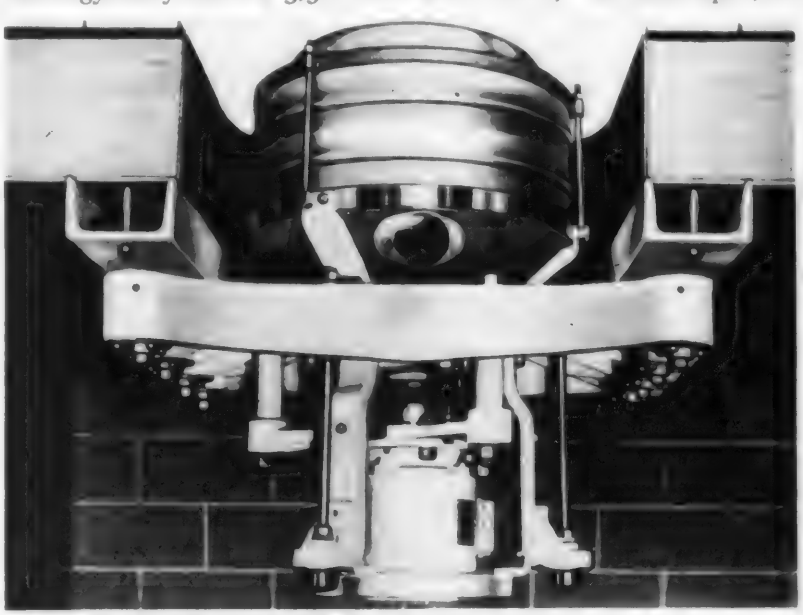
A special form of vibration generator was adapted to provide the particular gyratory movement required to operate this assembly, since the functioning of the spiral movement in the particulate mass postulated a highly critical combination of gyratory imbalance and cycle speed. It was found that a gyratory force of 3,500 lb. operating at 1,450 cycles yielded the best results.

A test of throughput capacity was carried out, using cornflour, the screens being dressed with 40 nylon mesh (aperture ·019 in.), when it was demonstrated that yields of over six tons per hour could be attained with a total screening area amounting to only $6\frac{1}{2}$ sq. ft. The nylon fabric proved well able to withstand the heavy stresses imposed in the processing of these massive loads, this being attributable to the special construction characteristic of the machine in which the maximum stretch of unsupported mesh is only $7\frac{1}{2}$ in.

Sieving in the Bakery

In bakeries, it is customary for the flour used to be passed through an eight inch mesh screen prior to processing. Recently, for reasons of hygiene, the employment of a 30 mesh sieve has been urged, an eight mesh being quite inadequate for the extraction of minute forms of life which inhabit bulk flour storage.

In order to meet the requirements of bakery establishments where bulk flour storage was located in an upper storey and fed by gravity to the machines at lower floor levels, a special gyratory vibration generator, which could be attached to the ceiling and fed through an aperture in the floor above, was developed, its



The ceiling mounted Cascade for bulk flour handling.

particular virtue being that no vibration was transmitted to the building structure.

Formerly, difficulties had been encountered with the sieving of certain types of powders, whose particles assumed an elongated wedge shape, *e.g.* many of the powdered plastics and metallic ores. When processing such materials on the gyratory sieving machine, even after prolonged runs of many hours, the mesh surface always remains perfectly clean.

Sieving Oily Materials

Another problem concerns the sieving of vegetable products containing natural oils, one of the most important of which is cocoa or chocolate powder. Any attempt to process such powders on the shaker type of screen will cause them to express their oil content and to assume a pasty consistency which, quite apart from being unsievable, will ruin the product.

Although these powders have to be graded very finely (between 100 and 200 mesh) it has been demonstrated that on the gyratory sieving machine this expressing of the natural oil content is eliminated and quite substantial throughputs can be attained.

This has an important significance, as chocolate manufacturers, in default of sieving, have hitherto been forced to resort to air separation in the production of this finely divided product, even though the oxidising effect engendered by this process has a very deleterious effect upon the flavour of the resultant chocolate.

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The Science of Advertising

"AN unadvertised article is like a mule—without pride of ancestry or hope of posterity." Time has not diminished the truth of Mark Twain's words, and there are few industries to which they apply with such force as food production. Any fresh contribution to the literature of advertising, therefore, demands attention.

According to the author of a recent book*: "Advertising is a science which draws its knowledge and usefulness from psychology and economics. It can also be likened to the last process in the factory—something the final coat of paint has been unable to achieve. It gives character to merchandise that is otherwise just 'factory made.'

"Like a pebble cast in a pond, scientific progress has created ever-widening ripples of knowledge. . . ."

So far, so good. Mr. Brandon, a professional advertising man, tells us that he sees a need for writing "something different from that which is at present available." No one will disagree with this sentiment. There is room for an objective book telling what advertising can and cannot do, and something of its techniques.

This is not what Mr. Brandon has produced. He ranges over a wide canvas, including propaganda, public relations, publicity, and mass psychology in his discussions. That in itself is no fault, but why adopt as a title "The Truth about Advertising"?

At the outset, the author indicates that he is going to prove to the reader that advertising is, to quote "1066 and All That," "a good thing." While there is room for polemics about this subject, it is the reviewer's opinion that they occupy too much of Mr. Brandon's space. As a result, the book falls between two stools—it is neither sufficiently instructive to be a good handbook, nor are its arguments incisive enough to carry weight.

That advertising can be a great power for good is not in doubt, but the effect of Mr. Brandon's efforts to persuade merely called to mind the remark attributed to the Duke of Wellington, surveying allied troops on the battlefield: "I don't know what effect they have on the enemy, but—damme—they frighten me!"—F. J. L.

* *The Truth about Advertising.* By Robert Brandon. Pp. 261+xv. Chapman and Hall. Price 8s. 6d.

Potato Storage

ANOTHER Food Investigation leaflet* dealing with the storage of ware potatoes in this country has been published. Written especially for the farmer and advisory officer, it contains recommendations which, if followed, should help keep potatoes in good condition throughout the winter.

Most of the potato crop is stored in field clamps. This is the traditional method and, under normal conditions, it is a good one, but since farming and social conditions have changed since clamping was first adopted, a different type of storage may now be more economical. For example, labour is now so expensive that it may be cheaper to employ a method of storage which allows rapid grading in all weathers. Clamp storage means that grading is slow and dependent on the weather. For this reason the leaflet, although discussing the best practice for clamp storage, also gives details of methods of storing in buildings and cool stores.

In fact, if one is available, it is usually better to store potatoes in a building than in clamps. The building will need insulation, which can be provided with bales of straw. An important point in deciding whether to store in a building is the distance the potatoes will have to be hauled to it. If it is desired to see graded potatoes through the storage season irrespective of the weather it may be profitable to provide a building if one is not available.

All the necessary information on ventilation, the depth to which the potatoes can be stacked, insulation, the temperatures at which they should be kept, and so on is given. There is also a section on the common injuries which potatoes suffer from bad storage and on the fundamental principles involved.

* *The Storage of Ware Potatoes in Great Britain.* Food Investigation Leaflet No. 16. Pp. 13. Published by H.M.S.O. for D.S.I.R. Price 9d.

TO AUTHORS

The publishers of FOOD MANUFACTURE are prepared to consider the publication of articles and text-books.

Food Packaging

Progress in 1953

John A. Buck

The year 1953 was signalised by numerous technical advances in the production of food packaging materials, and by improvements in methods and machinery used in package making. In this article the author describes the progress achieved in the many aspects of food packaging.

ONE result of the work directed towards improving the functional properties of metal containers, has been the development of the collar can for the packaging of coffee, cocoa, baby foods, biscuits, and many other products.

The new can is hermetically sealed and may first be opened only by the removal of a metal strip or collar, for which purpose a special key is provided. This leaves the snugly fitting lid attached to the body of the can by a hinge, enabling the can to be closed again after use. Thus, unlike the ordinary hermetically sealed Open Top can, the new container may be used for products which are consumed gradually in small amounts over a period of time, provided the products themselves have a reasonable storage life.

Canned Milk

Another interesting development within the canning industry is the use of Open Top cans for the packaging of fresh whole milk. Especially suitable for picnics or camping use, milk put up in small 6 oz. cans is already finding a wide market in the U.S.A. In Britain, fresh milk is at present being canned in 1 pint, 3 pint, and 5 pint containers intended for the export market and for use aboard passenger ships. It is thought that the potential demand in America is likely to be greater than that for canned beer, which is already accounting for some 10 per cent. of the total U.S. production of cans.[1]

Aluminium Containers

A relatively small, though increasing, use continues to be made of aluminium for the production of special types of can, decorated canisters, and extruded containers. Flat-shaped containers made from thin aluminium sheet are in use for packaging small portions of quick frozen fish. Another recent use for aluminium is in the construction of lightweight beer barrels lined with an inert, stoved lacquer to maintain the colour and quality of the beer. Christmas puddings in deep-drawn aluminium basins were on sale during the Christmas season.

Work has been started on the drafting of a new British standard specification for tinplate. This is being undertaken largely at the instigation of the British tin box manufacturing industry, which is concerned to improve the accuracy of food cans in order to meet the demand for higher canning speeds. Work is also in hand on a new standard covering tins for processed foods.

Transparent Films

A development of outstanding interest was the introduction of the new film based on polyethylene terephthalate. This material, more commonly known under the trade name Terylene, has for some time past been available as a synthetic fibre for use in textiles. It is only within the last year that it has been produced as a film.

At present, production is still on a very small, pilot plant scale for experimental and development purposes, and supplies are not yet available for ordinary packaging applications. When full scale production is achieved, the material is likely to make a most valuable addition to the range of films available for food packaging.

Polyethylene terephthalate can be cast in thinner gauges than is normally the case with transparent films, thus facilitating the production of films yielding approximately twice the area per pound weight than any other film in current use. Films of 0·0003 in. thickness can readily be produced, whereas other films cannot be made in thicknesses lower than about 0·0008 to 0·0009 in.

The material remains flexible at temperatures as low as −50°C., which suggests that it may ultimately prove most suitable for the packaging of quick frozen foods. It has a very low moisture absorption factor, combined with a high degree of dimensional stability.[2]

Polythene has hitherto been a most difficult material on which to print, and this has to some extent hindered its full development for certain packaging applications. It has now been found

A new range of food packs evolved by Design Research Unit for C. and E. Morton.

Saxby's pork pies are packed in Seal-Easi bags produced by John Dickinson and Co.

that by subjecting the film to a special surface treatment during manufacture, effects resembling those of 3/4 colour half-tones can be achieved. This new treatment is not merely a superficial surface coating, but is integral with the film, although its penetration is said to be of little more than molecular depth. The physical properties of the film remain unimpaired.

Poultry Packaging

Arrangements are now under way for the introduction into Great Britain of the special vacuum packing and shrink-wrapping process for the packaging of poultry, which is now being used for about 80 per cent. of the quick frozen eviscerated poultry sold in the U.S.A. The process involves the use of special bags, made from polyvinylidene chloride, which shrink by about one-third on immersion in hot water, thus forming a smooth, tight wrap. The film, known also as saran, is not yet available in Great Britain, and may initially have to be imported from the U.S.A.

One of the new uses for transparent films which emerged during the past 12 months was in the form of polythene bags for packaging a specially developed bread mix for the Everest expedition. Other foods used by the expedition were vacuum packed in bags made from laminated films.

Among some of the interesting new packs now being produced abroad are the small pouches of rubber hydrochloride film used in Sweden for the packaging of prepared mustards, horseradish sauce, and salad creams. In the U.S.A., a laminate of polythene film with an outer printed layer of cellulose film is used for the vacuum packaging of dill pickles in brine. Another pack, for potato crisps, consists of a combination bag of cellulose acetate film and sulphite paper. A small packet containing a mixture of silica gel and activated carbon is placed inside the bag to absorb moisture and "off" odours. It is claimed that this pack has added 10-14 days to the shelf life of the product.

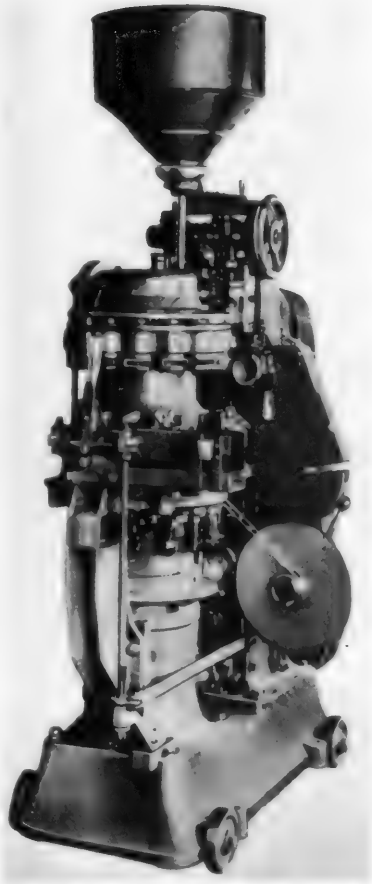
Rigid Plastic Containers

The past year has seen the appearance of a number of attractive chocolate boxes made from transparent acetate sheet; boxes with board bases and transparent cellulose acetate lids are also being produced. Another transparent plastic material, polystyrene, is being used for making moulded containers for cooked foods. These packs are sealed hermetically by special heat sealing equipment.[3]

The development has been announced of a new wet-strength paper for packing between layers of fish; it is also suitable for many other purposes, including the wrapping of ice cream.

The paper is an unbleached sulphite type, dyed slightly blue to distinguish it from grades which have not been treated for wet-strength. The treatment itself consists of impregnation with a urea synthetic resin, which gives a sevenfold increase to the wet-

A range of chocolates and liqueurs wrapped and banded by the Rasch Universal foiling machine. *Photo Norman Bartleet Ltd.*



The Alka B.14 machine for the sealing of bottles with aluminium foil caps.

strength of the paper. The final product is similar in performance to vegetable parchment, formerly used for the bulk packaging of fish, but the new material is considerably cheaper.[4]

Another new material comprises a sandwich of aluminium foil between two plies of kraft paper, one of which is coated with polythene. This polythene coating provides the medium for heat sealing, and also forms a secondary moisture barrier. The material is supplied in a width of 24 inches in 50 or 100 yard rolls.

Packaging Quick Frozen Foods

For the packaging of quick frozen foods, composite containers with waxed paperboard bodies and lacquered metal ends are now becoming popular, since the readily conductive metal parts of the pack enable rapid freezing to be more easily achieved. Packs of this type are now used for packaging quick frozen fruits in syrup, and quick frozen vegetables of various kinds.

Another pack for quick frozen fruits in syrup consists of a waxed paperboard carton complete with an integral liner of polythene coated paper. This liner is heat sealable, and prevents any risk of leakage from the pack.

For the bulk packaging and shipment of frozen fish fillets, a new method has been evolved whereby the blocks of fish are placed in bags made from a heavy waterproof viscose film. The bags are then heat sealed and packed into 42 lb. fibreboard cartons for storage in a refrigerated hold at $-21°C$.

Packaging Research

Progress towards the better understanding of the properties and applications of modern packaging materials increases almost daily, and the past 12 months have seen many useful additions to our knowledge.

Work on a number of interesting problems has been undertaken in this country by the Printing, Packaging, and Allied Trades Research Association. Among the projects recently carried out was an investigation into the light-transmission properties of transparent films. It was found that where the maximum protection is required, a coloured film, or one especially formulated to be opaque to ultra-violet light, should be used.

All normal clear transparent films transmit some ultra-violet light, causing many food products, especially those containing fats, to deteriorate. The degree of deterioration of any particular food product depends upon the wave-length and intensity of the incidence light, and on the length of exposure. Atmospheric oxidation, resulting in an off-flavour, is accelerated by short wave-length radiation of below 4,500 Angström units.[5, 6]

A series of investigations into the effect of overwraps and bulk storage on the shelf life of biscuits and cigarettes has also been conducted by PATRA. It was found that packets of 20 cigarettes had their shelf life increased by about three times on being overwrapped with moistureproof cellulose film. Shelf life was also found to be improved by stacking the packets together in bulk. When the wrapped packets were bulked together in tens, the life of the packet was doubled. On bulking 500 packets together, the life of each packet increased between three- and six-fold.

Similar results were obtained in the experiments on $\frac{1}{2}$ lb. packets of biscuits. When 30 of these packets were bulked together, the storage life was increased by one-and-a-half to three times, depending on the position of the packet in the outer case. Packets adjacent to the corners of the case had the shortest life.

A new hand plier heat sealing unit produced by A. H. Bland (Engineers) Ltd.

A colourful range of transparent packages designed for Peek Frean by Richard Lonsdale-Hands Associates.

For the purpose of the experiments each ½ lb. packet was wrapped in a heat sealed moisture-proof cellulose film. Thirty of these packets were then inserted in a waxed paper liner inside a solid fibreboard case. This liner, consisting of a single sided waxed paper, heat sealed at all seams, had the effect of doubling the shelf life of all packets, irrespective of their position.[7]

In addition to work on its normal research programme, PATRA has continued its package testing and advisory service for those of its members requiring information or advice on a variety of packaging problems. One item includes the development of a specialised piece of apparatus which enables observations to be made to determine whether the fish used in packs of canned herrings are firm enough to withstand transport shocks.[8]

Some interesting facts emerged from recent research carried out in the U.S.A. on the use of transparent films for the packaging of poultry. The films tested were: viscose, polythene, saran, and rubber hydrochloride. It was found that the overall performance of each film was essentially similar during 48 hours' storage. The carbon dioxide and oxygen contents of the pack remained virtually the same for all films, and no hydrogen sulphide was found to be present in the packs at any time during the tests.

The investigators observed that a significant change took place in the quality of the poultry at some point between 48 and 72 hours' storage. This change was characterised by the development of "off" odours and the formation of slime. None of the packs was saleable after 72 hours' storage, but the severe dehydration which took place in unwrapped poultry within 24 hours confirmed the need for a protective wrapping. Weight losses of packaged poultry during 48 hours' storage were half as great as those occurring in unwrapped poultry.[9]

Bottling Techniques

A recent development in bottling techniques is the use of aluminium foil caps for the sealing of bottles of beer and mineral waters. These caps are similar to those widely used in Great Britain for the sealing of milk bottles, except that they are fitted with a special liner, usually of natural or composition cork.

Caps of this kind are especially suitable for bottles to be taken on picnics and for off-licence sales, and are already extensively used for such purposes in Austria and Sweden. They are made and fitted by a special machine which inserts the liners in the caps before they are conveyed to the capping heads. This procedure enables substantial savings to be made over traditional methods, since the bottler is able to produce his own seals.

Heat Sealing Equipment

A wide range of equipment, capable of solving almost any heat sealing problem, is now available. One of the latest units has been specially designed for the sealing of triangular sandwiches in viscose film.

For the sealing of difficult or bulky packs made from polythene, polyvinyl chloride, or rubber hydrochloride film, a new hand-plier unit is now available giving a seal 6½ in. long and ⅞ in. wide. This appliance is especially valuable for the sealing of thermoplastic liners such as are now used in fibreboard or metal drums for the conveyance of foods in liquid, paste, or powder form.

Another type of sealing machine is one which can be adapted to handle either flat or upright packets which are passed through the machine on a continuous band at a speed of 25 ft. per minute. This machine is available in two models, one for sealing polythene, polyvinyl chloride, and rubber hydrochloride, the other for sealing thermoplastic-coated materials and moistureproof viscose film.

Several machines have recently been introduced for the manufacture of polythene bags. One of these is capable of making the bags continuously from layflat tubular or gusseted film in a maximum width of 16 in. With bags not exceeding 12 in. long, an output of 60 per minute can be achieved. Bags of between 12 in. and 14 in. long may be manufactured at a rate of 30 per minute. If desired, the length of the bag may be adjusted while the machine is still running.

Another machine enables either plain or gusseted bags to be produced within the size range 2 in. wide by 3 in. long, up to 12 in. wide by 20 in. long. An output of 40 to 80 bags a minute is obtainable.

Polythene bags ranging in size from 2½ in. to 108 in. long and up to 39 in. wide can be produced on another fully automatic machine.

A new Maison Lyons tea pack comprising a printed tin with Cellophane overwrap.

With bags of 3½ in. wide by 12 in. long an average output of 6,000 to 8,000 per hour can be achieved.

Confectionery Packaging Machinery

A machine for the wrapping of chocolate liqueurs, pralines, etc. in aluminium foil has been introduced. A special attachment enables printed bands or labels to be applied at the same time as the foil, if so desired. The machine is easily adjusted for various sizes, the range being as follows: length, from $\frac{5}{8}$ in. to 4¼ in.; width from $\frac{5}{8}$ in. to 2 in., and thickness from $\frac{1}{16}$ in. to 1⅜ in. Rapid change from one size to another can be achieved without the use of change parts. If desired, the machine can be adapted for the wrapping of chocolate eggs.

For the automatic bagging of sweets and other commodities at a rate of 26 to 30 bags per minute, a new machine has recently been designed. It will handle transparent film bags in three different sizes, and can also be supplied to deal with other special sizes, if required. The standard sizes are: $3\frac{7}{8}$ in. wide satchel type; 3¼ in. by 1¼ in. gusset type; and 2¾ in. by $\frac{7}{8}$ in. gusset type. Lengths up to 7½ in., with 1 in. adjustment, can be accommodated. For general use, the machine is operated in conjunction with an automatic weighing machine.

The introduction of a redesigned version of a pre-war twist wrapping machine was also announced during 1953. This machine will handle continuously printed or plain waxed paper, or cellulose film. It can be adapted to give any desired output from 160 to 200 wrapped pieces per minute. The size limits for this machine are: length, $\frac{5}{8}$ in. to 1⅜ in.; width, ½ in. to $1\frac{1}{8}$ in., and thickness, $\frac{1}{16}$ in. to ¾ in.

Another machine, now available, has been designed for the packaging of sweets in window cartons. Every operation, including the forming, filling, and closing of the carton, is performed automatically. The size range is: width, 2½ in. to 4¼ in.; depth, 1 in. to 2¾ in.; height, 5 in. to 9 in. The cartons are of the type with two side flaps and one top flap with a tuck-in lid.

In the past, users of cartons have sometimes been hindered by the scarcity of cartoning equipment which can be readily adapted to handle a wide range of sizes. It is therefore of interest to note that one of the latest cartoning machines to become available in Great Britain has been especially designed to facilitate a rapid change from one size to another. In operation, the machine takes the flat carton (either reverse or "airplane" tuck), from the magazine and opens it. The bottom flaps are then automatically tucked by the machine and, the carton conveyed past an operator, who fills it by hand. Thereafter, the bottom flaps are tucked automatically and the finished package discharged on a conveyor belt.

Sufficient accommodation is provided along the machine for five operators, so as to permit high speed filling with multi-piece goods. Two models are available, one for handling cartons ranging from ½ in. by ¾ in. by 2¼ in. up to 3¼ in. by 3¼ in. by 8 in., and the other for cartons of ⅞ in. by 1 in. by $2\frac{1}{8}$ in. up to 4 in. by 4 in. by 9 in.

A carton gluing machine capable of handling up to 100,000 cartons per hour is now being produced. It is designed to deal with flat blanks from 1 in. wide to 14 in. wide, and ranging in length from 2 in. to 30 in.

Weighing Machine

For the weighing of biscuits, powders, tea, dried fruits, and similar products, a new vibrator feed type machine is available. Capable of 14 to 20 weighings per minute, it can handle quantities of from one to 16 oz. Twin units, consisting of a pair of heads mounted on a common base, can be supplied. In addition, triple and quadruple units are also obtainable for use in conjunction with packaging plants.

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Country Life

A PRELIMINARY glance at the opening chapter of a five century chronicle* of domestic life in this country suggests that life in the days of the first Elizabeth differed little from that of today, so far as the housewife is concerned. These remarks are based on the following extract: "Whether the *ménage* was large or small she had to manage it. The maids, whether one or two or a whole retinue, must be kept cheerfully busy at all the multifarious household tasks. By far the most important of these was the preparation of the daily meals. Nothing can be done by people who are not fed. To turn out an appetising and filling meal for midday was the crown and seal of the yeoman housewife's day."

This is not to belittle the tremendous task, admirably accomplished, of the joint authors in collating the wealth of information that appears in this interesting and eminently readable book.

The work and life of the gentry and underlings are faithfully described through the days of Elizabeth I, Cromwell, the Restoration, and the Georgian era when men's wages, in time of full employment (a rare occurrence), ranged from 1s. to 1s. 6d. a day, and a pair of shoes cost 3s. 9d., to the late Victorian countrywoman of the nineteenth century.

At the beginning of the twentieth century, life was beginning to become a little less arduous for the cottage housewife, but was still far removed from the luxury of the Archer's of radio fame.

This book is a testimony to the industry of the authors in conveying to their readers, by word and picture, a vivid impression of the English rural scene during the epochs covered.

* *The English Countrywoman.* By G. E. and K. R. Fussell. Pp. 221+xvi. Melrose. Price 30s.

Abstracts From Recent Food Literature

Application of Formamide as an Extraction Solvent with Karl Fischer Reagent for the Determination of Moisture in Some Food Products. E. A. McComb and H. M. Wright (*Food Tech.*, 1954, **6**, 73).—Formamide was investigated as an extraction solvent for use with Karl Fischer reagent for the determination of moisture in beans, cake mix, dried whole eggs, egg noodles, rolled oats, potato starch, rice, wheat, and garlic, onion, orange, and tomato powders. Formamide was found to be more versatile than methanol, the commonly used extraction solvent. The results obtained are reported and compared with those determined by vacuum - oven methods.

Recovery of Sugars from Pear Canning Waste. A. M. Neubert, D. W. Graham, J. L. Henry, J. E. Brekke, and C. L. Beardsley (*J. of Agric. and Food Chem.*, 1954, **2**, 30).—A process for the recovery of sugars and other soluble solids from peelings, cores, and trimmings wasted in canning pears involves conversion of the milled waste into a calcium pectate gel from which a clear, pectin-free juice is easily pressed, removal of excess calcium by means of an ion-exchange resin, and removal of colour by precipitation and by adsorption with activated carbon. The purified juice, when used as a syrup base for canning pears, replaces about one-third of the refined sugar now used in canning this fruit. The pomace, which amounts to about 25 per cent. of the waste, can be dried in a continuous rotary drier for use as a feed.

A Technique for the Approximate Quantitative Prediction of Flat Souring in Canned Peas. G. G. Knock (*J. Sci. Food Agric.*, 1954, **5**, 113).—A technique for the survey of pea canning lines is described. It is shown that the percentage of canned peas that will sour on incubation at 131°F. may be predicted approximately by enumerating the flat-sour spores in unprocessed cans, expressing the cannery process in terms of decimal reduction times for flat-sour spores, calculating the number of surviving spores per can and from this, the percentage spoilage.

Corrosion for Chemical Engineers. L. L. Shreir (*Corrosion Tech.*, 1954, **1**, 6).—The application of the theoretical principles of corrosion to practical problems is described, and methods are given by which corrosion can be avoided in the earliest stages.

Pasteurisation and Storage of Sweetened and Unsweetened Lime Juice. O. W. Bissett, M. K. Veldhuis, and N. B. Rushing (*Food Tech.*, 1954, **8**, 136).—The effects of different heat treatments were judged on the basis of bacterial counts, flavour, destruction of pectinesterase enzyme, and cloud stability. A heat treatment of 150°F. was effective in reducing the number of micro-organisms to a low level, but a temperature of 170°F. was required to destroy pectinesterase and ensure cloud stability in storage at 35°F. Under refrigeration, the flavour of the heated products remained practically unchanged for 15 months, but some changes were observed in the unheated samples. At 80°F. all samples deteriorated rapidly.

Bactericidal and Drying Effects of Smoking on Bacon. N. E. Gibbons, D. Rose, and J. W. Hopkins (*Food Tech.*, 1954, **8**, 155).—Destruction of bacteria and loss in weight of bacon during experimental smoking were found to be correlated to some extent with smoke density, duration of smoking, temperature of the meat, and humidity of the smokehouse. Smoke density and temperature were the most important bactericidal factors. Weight loss was correlated primarily with humidity and was actually slightly retarded by the combined surface action of heavy smoke and high temperature.

The Cheese Making and Zootechnical Institute, Mantua. L. Matiotti (*Alimentazione*, 1954, **4**, 26).—Founded in 1933, the Cheese Making and Zootechnical Institute at Mantua has developed from modest beginnings into a first class research and advice centre with modern laboratory equipment. Prominent feature is an ambulant laboratory which is installed in a converted coach and is available to cheese makers through the Province for on-the-spot tests and analyses.

Canned Vegetables. R. Baquiast (*La Revue de la Conserve de France et de l'Union Française*, 1954, **9**, 29).—The author points to the error of the widespread opinion that the quality of podded beans and peas is necessarily dependent on the small size of the pods. He recommends the cultivation, for the special requirements of the French canning industry, of certain well known varieties hitherto little used on the French market, and the application of certain standards designed to ensure a uniform quality for labelled products.

Compression of Dehydrated Mutton Slices. A. R. Prater (*Aust. J. of Applied Science*, 1953, **4**, 603).—The loose packing density of dehydrated mutton slices (0·2 g./ml.) has been increased more than threefold by compression. The effects of various compression techniques on texture of blocks have been studied, and a procedure described for the production of firm, compact blocks with good slice size after reconstitution.

Recent Studies on the Mechanism of Fat Oxidation in its Relation to Rancidity. S. G. Morris (*J. Agric. and Food Chem.*, 1954, **2**, 126).—A review of American and British literature pertaining to the autoxidation of fats. Data obtained by various techniques by numerous workers are discussed in relation to the mechanism of oxidation of mono-, di-, and triethenoic fatty acids.

Deficiency Diseases and pH. E. Delmas (*Fruits*, 1954, **9**, 16).—The occurrence of deficiency diseases in vegetables is often related to soil reaction. Generally, deficiency diseases are encountered mostly when the *p*H value of the soil exceeds a given value, close to that corresponding to neutrality. A light acidity of the soil improves the nutrient-assimilating capacity of the plants. There is no diffi-

culty if the *p*H value of the soil lies between 5 and 7, since acidity of this order is not harmful. This also applies to soils in semi-humid and humid tropical regions. Below these values, however, the acidity may become harmful, and it is probable that other factors have an unfavourable influence on the development of the plants.

The Quality of Boiling Sausage and the Determination of Meat Hydration. R. Grau and R. Hamm (*Die Fleischwirtschaft*, 1954, **6**, 36).—A simple method has been developed which can be used to predict, without calculation, whether certain meat is likely to yield boiling sausage with a poor, mediocre, good, or very good hydration capacity. A weighed sample of the meat is pressed on filter paper. The greater the hydration, the greater is the area covered by the compressed meat which is evaluated by means of a Plexiglass "ring foil." The method is particularly useful in avoiding the wasteful use of meat which is, in spite of its appearance, little suited for sausage manufacture.

Sanitation in Meat Processing Plants. F. Kornfeld (*Die Fleischwirtschaft*, 1954 **6**, 41).—Hygienic requirements in meat processing plants call for the use of disinfectants which, though highly efficient in killing bacteria, have no harmful effects on the meat itself. A group of chemicals, known as Ampholyt soaps, has been developed in an Essen factory which, while being highly disinfectant, are completely odourless and non-toxic, and have a *p*H value similar to that of water so that they are not harmful to the human skin. In the course of further research work, one of the Ampholyt products particularly suited for meat processing plants has been further developed and is now marketed under the name TEGO 51.

Testing the Stability of Oils and Fats by Means of the Swift Stability Test. E. Becker, H. Pardun, H. von Pezold (*Fette und Seifen*, 1953, **55**, 880).—An improved version of the Swift stability test has been used to determine the incubation time of selected oil samples up to a peroxide number of 200, while the stability of similar samples was organoleptically determined in parallel storage tests. It was found that there is a certain correlation between incubation time and iodine number, and between incubation time and storage stability. There is, generally speaking, no direct or inverse proportionality, but a quasi-linear relationship can at least be established between the incubation time and the stability of one and the same oil. The incubation time to be expected in the Swift stability test can be predicted, with 90 per cent. probability, from the oleic acid, linoleic acid, and linolen acid contents of the oil concerned, while the relationship between incubation time and stability can be predicted with 70 per cent. probability. The Swift stability test can supplement, but not replace, the normal storage test of vegetable oils.

Electronic Sterilisation of Food. R. S. Hannan (*Research*, 1953, **6**, 376).—One of the latest techniques for sterilising foodstuffs is based on the use of ionising radiations, the lethal properties of which act to produce the desired result. The process is still in an early stage of development and the article summarises the main features of electronic sterilisation of foods that have emerged so far.

Dutch Invention gives New Approach to In-bottle Sterilisation. Anon. (*Bottler and Packer*, 1953, **27**, 60).—The Conti pasteuriser by N.V. Bronswerk, Holland, takes bottles of milk, beer, etc., in metal cases. Still beverages can also be filled while the bottles are in their crates and milk bottles receive aluminium caps in the crate. In-crate bottle washing is also possible.

Coloured Grapefruit Juice

A NEW method for canning the juice of pink and red grapefruit, to obtain a product having the same attractive colour as the fruit itself, is under development at the United States Fruit and Vegetable Products Laboratory, in Weslaco, Texas.

To maintain the market price advantage of this coloured fruit, packers must adhere to rigid quality standards. At least 25 per cent. of the crop is normally classed as culls, suitable only for juice production. Ordinary canning methods have not proved satisfactory for processing juice from coloured grapefruit. It tends to be "muddy" or brownish and unattractive in appearance.

Scientists at Weslaco have found that the pink or red colour is due to two pigments (lycopene and carotene) that occur in the fruit pulp but not in the juice. Normally, most of the pulp is screened out before the juice is canned, but to keep natural colour in the juice, screened pulp is added to the juice in such a way that it will stay suspended uniformly throughout the final product.

This juice has been canned single strength and also prepared as frozen concentrate, initial storage tests of both products being encouraging.

The canned single strength juice is still under test for colour and flavour stability. Other factors, such as the possible increase in bitterness caused by the addition of the pulp and the age of the fruit to produce the best juice, require further study. Indications to date are that processing grapefruit when it is barely ripe is important in obtaining juice with superior natural colour.

Recent Advances in Protein Nutrition

(*Continued from page* 186)

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News from the Industry

FORTHCOMING EVENTS

The Chemical Society

A reception and conversazione is to be held at 6.30 p.m. on May 7 at the Senate House, University of London, W.C.1, by kind permission of the University authorities.

The Institute of Biology

A visit to the East Malling Research Station, by the kind invitation of the Director, Dr. F. R. Tubbs, has been arranged by the Institute of Biology for Saturday, May 15.

Incorporated Plant Engineers

The Seventh Annual Conference of Incorporated Plant Engineers is to be held at the Grand Hotel, Scarborough, from May 19 to 21.

The Nutrition Society

The Scottish Group of the Nutrition Society is to hold a symposium at the University of Glasgow on "Nutrition and the Liver" on May 8.

The annual general meeting of the Society will be held at the London Hospital Medical College, London, E.1, on Saturday, May 22. In connexion with this, there will also be a meeting for the presentation of original papers and demonstrations.

Nutrition Congress

The Third International Congress of Nutrition is to be held under the auspices of the International Union of Nutritional Sciences at Amsterdam on September 13 to 18, 1954. The programme will include sessions on the following topics: Overnutrition and Disease; Nutrition and Liver Disease; Parenteral Nutrition; Nutrition and Psyche; Non-nutrient Foreign Chemical Substances in Foods (Intentional and Non-intentional Additives).

Borough Polytechnic

A course of four lectures on Soaps and Synthetic Detergents is to be given by Dr. K. G. A. Pankhurst at the Borough Polytechnic on May 3, 10, 17, and 24 at 7 p.m. The outline syllabus is as follows:

1. History of the soap and synthetic detergent industries. Classification of detergents. Methods of Analysis.
2. The nature and measurement of surface tension. Contact angles and the phenomenon of "wetting."
3. Orientation of detergents at interfaces. Emulsification. Foam formation.
4. Micelle formation and the physical properties of detergent solutions (osmosis, electrical conductivity, solubility, etc.).

The Society of Chemical Industry

On May 12, the Food Group of the Society of Chemical Industry will visit the British Baking Industries Research Association at Chorleywood.

The following meetings have been arranged by the Agriculture Group for May:

May 18. The annual general meeting to be held at 5.30 p.m. at the Chemical Society, Burlington House, Piccadilly, London, W.1., when the chairman of the Group, Mr. W. Leonard Hill, chairman of Leonard Hill Ltd., will address the meeting.

May 22. Annual summer meeting of the Group, who will visit the National Institute of Agricultural Engineering at Silsoe, Bedfordshire.

The May meeting of the London section will take place on May 3 (6.30 p.m.) at the Chemical Society's Rooms, when Prof. T. P. Hilditch will read a paper entitled "The Fats: A Story of Nature's Art." This is a joint meeting with the Oils and Fats Group.

Twines and Cords

A further section of B.S. 1133 "Packaging Code" has now been published dealing with the use of twines and cords for packaging. The original edition of the cordage section of the Packaging Code quoted freely from Government department specifications for twines and cords, but in this revision greater emphasis has been laid on the provision of guidance to industry. British Standards are being prepared which will give more precise technical detail concerning twines and cords and the Code recommends that reference should be made to these when they become available.

Inverted Bucket Steam Trap

An entirely new design of the Spirax-Sarco inverted bucket steam trap is now available in three sizes, each of which is in three pressure ranges. These are 200, 120, and 60 p.s.i. for the $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch size.

A notable feature, common to all sizes of the trap, is that the bucket, bucket arm, and valve (all of stainless steel, as is the valve seat) are a single unit; at no point is this operating unit attached to anything.

Each size of trap has alternative straight connexions (inlet and outlet in a straight line) or angle connexions.

Technical Periodicals

Immediate open access to over 3,500 scientific and technical periodicals in all languages has been provided by a new extension to the Patent Office Library which is now open to the public in the basement of the headquarters building in Chancery Lane, London.

All this periodical material, ranging over the whole field of technical invention from agriculture to zinc, will now be conveniently arranged on open shelves, and will cover items published since 1920. Earlier volumes will continue to be supplied on demand.

Another important addition will be the provision of a special section for bibliographies and abstracts.

The extension has been made possible by a general rearrangement of the library and by overhauling the wartime accumulation of unbound volumes. These arrears have been reduced from 22,000 to 14,000 in the past three years and will be further reduced to 10,000 by the end of this year.

A spring sales drive on Patent Cornflour and Flavoured Cornflour in five pint and three pint packs is being made by Brown and Polson. The first of the large scale window and store displays which are being made with the co-operation of the trade was carried out by Selfridges for a fortnight from March 15.

Diesel Engine for Commercial Vehicles

A new Diesel engine, designed as an alternative to the petrol engine for the two and three ton range of Thames commercial vehicles, is now in production at Ford Works, Dagenham. It is of 3·61 litres capacity, four-cylinder, developing 60 b.h.p. at a governed speed of 2,400 r.p.m.

Reward for Success

To celebrate the completion of 25 years' successful working at Dagenham and the good results obtained in 1953, the Ford Motor Company are to make a payment of £10, subject to tax, to each employee of the company and of its subsidiary companies, who had not less than six months' service with the Group in 1953, and was in the employment of the company or one of its subsidiaries at December 31, 1953.

Fruit and Vegetable Dehydration

Many manufacturers, using fruits or vegetables in their products, limit their production period to fit in with the harvest time, but the British dried fruits and vegetables produced by F.M.S. (Farm Products) Ltd. opens up new opportunities for spreading production throughout the year.

Available in strip, dice, finely chopped, and powder forms, the dried products are gas packed in tins to give long storage life without loss of quality, and include potato mash powder for which F.M.S. are the sole patentees throughout the world.

As the vegetables have lost 90 per cent. or more of their water content, storage, handling, and transport are all made easier and cheaper. There is no wastage and no preparation in the form of washing, peeling, or trimming.

With some 17 years' experience and working through seven factories situated in selected growing areas, the company can offer a wide range and quality of fruit and vegetables throughout the year.

Germicidal Tubes for the Retailer

The ultra-violet germicidal tube, already in extensive use in many large food production and distributive centres, has now, by the introduction of a smaller, inexpensive version, become available to retail food traders.

Manufactured by Philips Electrical, the new 7-watt tube, which emits powerful bacteria and mould killing radiation and measures only 5¾ in. × 1 in., has already been put to the test in such diverse applications as sausage making, penicillin manufacture and packing, and in the sterilisation of hairdressers' instruments. A typical illustration of its use, both for the protection of stored food against spoilage, as well as for better hygiene where perishable foods are on display, is to be found in the Family Health Store at St. Leonards-on-Sea, Sussex.

Two 7-watt tubes have been installed in a display cabinet which has a capacity of approximately 14 cu. ft. Apart from its low initial and running costs the tube has the added advantage of not requiring any special ballasts or operating circuits. It runs straight off 200-250v AC mains and is fitted into an ordinary screw type lampholder. It is claimed that under this system butter, cheese, and various "health foods" retain their freshness without any kind of refrigeration, and even when strong cheese was kept near butter, there was no smell transfer.

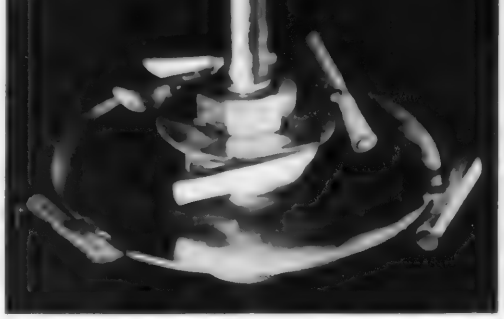
Two of the larger 15-watt tubes are employed in the basement store, covering about 30 sq. ft. each. Experience has shown that a remarkably fresh atmosphere is maintained under all conditions, with freedom from smells, and with an absence of mould.

Novel Mixing Equipment

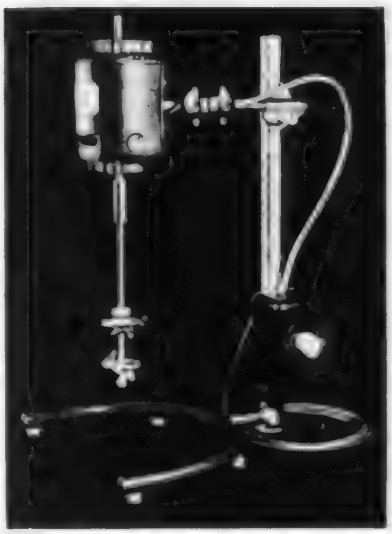
Constructed on entirely new principles, the Osborne Impelator can carry out, with speed and low power consumption, the making of solutions, the mixing of liquids with solids and of liquids of varying viscosities, and the preparation of emulsions.

The unit, consisting of a series of discs, two to each series, upon which small conical tubes are mounted, has been designed not only to set into motion the media to be mixed, but also to combine the effect of centrifugal force, suction, and shearing action. The liquid, or mixture of liquid and solid, which is sucked through the tubes during rotation, impinges on the already moving bulk of the mass, thus effecting thorough shearing by way of mutual friction of the particles, resulting in the production of a well-dispersed and homogeneous mixture of minute individual particle size.

The combined effect of the unit results in a fast dispersion and in an immediate equalisation of viscosities. Standard emulsions containing as much as 40 per cent. or more fat will remain emulsified for long periods without separation of water.



The head of the Osborne Impelator, showing angles of tubes and adjustable mixing head.



The laboratory mixer is fitted with variable speed motor from 600 to 1,400 r.p.m.

The standard types available are:

1. Industrial type for larger, either circular or rectangular, vessels.

2. Semi-industrial type for capacities up to about 25 to 30 gal., portable and adjustable by means of a special mounting for vessels of different diameter.

3. Laboratory type, mounted on pedestal, adjustable and fitted with a variable speed motor from 600 to 1,400 r.p.m.

Tests carried out with the mixer gave the following results:

(*a*) Sixty-five gallons of a hot dispersion of 3 per cent. glyceryl monostearate in water with 360 lb. molten fat, added gradually, yielded a stable and thin emulsion after 40 minutes at a speed of 900 r.p.m.

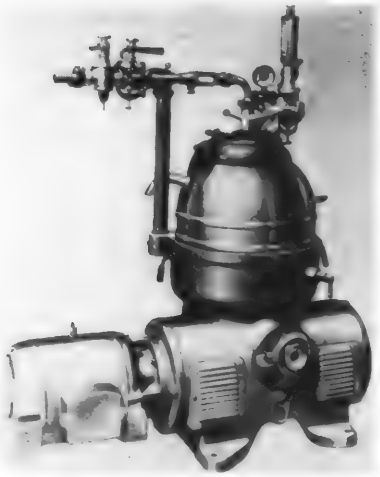
(*b*) Complete emulsification of fats and water in the presence of emulsifying agents and stabilisers prior to homogenisation was effected within 30 to 45 minutes at speeds ranging from 900 to 1,200 r.p.m.

(*c*) Whole dried egg was completely reconstituted in three minutes at a speed ranging from 900 to 1,400 r.p.m.

(*d*) Mixtures of glucose and water yielded a homogeneous solution on stirring for five minutes at a speed of 600 r.p.m.

(*e*) Oil and pigment mixtures formed stable emulsions in 30 to 45 minutes at a speed of 500 r.p.m.

A demonstration unit is available at the factory of the makers, The Osborne Engineers, who will be glad to test the materials of those interested and report on the results obtained, or carry out a test in their presence.



Westfalia clarifier for beer, fruit juices, yeast, molasses, starch, etc.

Westfalia Separators Return

Sixty years after the founding of the company, Westfalia Separator, A.G., are returning to supply the British market and have appointed T. Giusti and Son as their sales and distribution agents in the United Kingdom.

Many models of varying capacities (some handling several thousand gallons per hour) have been developed to meet the needs of the food, chemical, and paint industries for clarifying, separating, mixing, and extracting.

One of the most useful models of the range is the multi-purpose laboratory centrifuge, with four interchangeable bowls.

It is claimed that the efficiency of all Westfalia separators is achieved mainly by their higher speeds of operation (12,000 r.p.m. in the case of the multi-purpose laboratory model). These higher bowl speeds have been brought about by making the bowl itself of high tensile chrome steel, lined with stainless steel to ensure that no corrosion can occur.

The worm gears drive has been carefully designed, both gears and worms being fitted with replaceable rings, a feature which should certainly result in lower maintenance costs.

FUTURE ARTICLES

AMONG the articles to be published in forthcoming issues of FOOD MANUFACTURE are the following: A description of a French quick freezing factory, "Hygiene in Meat Manufacture," "Microbiological Problems in Food Preservation in the Netherlands," "Progress with Quaternary Ammonium Compounds," "Functions of the Stabiliser in Ice Cream Manufacture," and "Pilot Plant Production of a Milk Substitute from Groundnuts."

Export of Labelling Machinery

The complete export for Newman labelling and gumming machines has been taken over by Clifford Packaging Machinery. Telephone: PRImrose 6688.

Bacon Carcass Competition

Challenge cups were presented by Mr. Cecil W. Rodd, chairman of Wall's, to prize-winners in the first South-East Regional Bacon Carcass Competition, organised by the Middlesex Branch of the National Farmers' Union in co-operation with Wall's.

Among the 145 entries judged were pigs from Berks, Bucks, Cambridgeshire, Essex, Herts, Isle of Ely, Kent, Middlesex, Norfolk, Oxon, Surrey, East Sussex, and West Sussex.

The judges were Mr. R. W. Pomeroy of the Animal Research Station and Mr. Collan Brett, Wall's bacon production manager.

Mazda Lighting for Sweet Factory

Mazda fluorescent fittings have recently been installed throughout the new Leeds factory of Rogalls, well-known nougat manufacturers.

Lighting in the main factory area is by more than 30 twin-lamp 5 ft. fluorescent fittings mounted in up-and-down positions directly on to the south slope of the north sky factory roof. Each of four bays has been lighted in this way and the fittings have been specially grouped in banks of either two or three corresponding to the amount of light required in particular areas.

A shadow-free illumination, to the value of approximately 15 lumens per sq. ft., enables the operators to attend to their manufacturing processes with the maximum of visual comfort.

Over 30 single-lamp fittings are mounted directly on to a 10½ ft. ceiling in the warehouse, packing rooms, and stores, providing an illumination level of between 8 and 10 lumens per sq. ft.

Fire Control

A new type of pressure-operated extinguisher in which chlorobromomethane, the new fire fighting chemical, is held with absorbed carbon dioxide under constant pressure is being marketed by Nu-Swift.

In tests carried out on a petrol fire, 2 sq. ft. in size, an old-fashioned quart size Nu-Swift hand pump holding carbon tetrachloride, failed to extinguish the fire after 40 seconds' pumping, while the pressure-operated chlorobromomethane extinguisher, of the same size, put out a similar fire in 1½ seconds.

This increase in fire fighting power is attributed to the low inhibitory factor of chlorobromomethane compared with that of other chemicals in commercial production; another important factor is the thorough atomisation of chlorobromomethane by the carbon dioxide.

Stated to be particularly effective on extra hazardous risks, such as all electrical equipment, medium-sized organic solvent fires of all types common in laboratories, garages etc., and spill fires from modern aeroplanes, this extinguisher, less than 16 in. high, is marketed under the registered trade name of Chloro-Flash.

The sealed pressurised charge makes this type of extinguisher particularly suitable for use in the tropics; it is also effective at arctic temperatures as chlorobromomethane freezes only at −120°F.

Tea Weighing Machine

The autopack double-beam high speed tea weighing machine has been completely remodelled and is now made in the following sizes:

oz.	*Weighings per min.*	*Accuracy grains*
1- 4 ..	30-40	+2-3
2- 8 ..	20-24	+3-4
4-16 ..	16-18	+4-5

The machine, which is also suitable for handling cereals, sugar, and flour, can be supplied mounted in twin, triple, or quadruple sets to give faster outputs and can be fitted with bulk hoppers, feeding and outlet conveyors, etc., to suit requirements. Alternatively, it can be supplied with a strong rigid floor stand fitted with grid and chute to catch spilt material and packing table.

Autopack double beam high speed tea weighing machine.

APPOINTMENTS AND RETIREMENTS

Mr. P. C. Adams has been appointed manager of Campbell's Soups

*

Mr. J. F. Willis has been appointed their representative for Scotland by Hopkinsons.

*

Mr. R. W. T. James, general production manager, Kraft Foods, has been appointed to the Board of Directors.

*

Mr. Arthur E. Skan, a director of the Ellison Group of companies, has been elected chairman of the British Plastics Federation.

*

Mr. C. E. M. Goodrick, B.Sc., F.R.I.C., has been appointed deputy factory manager at Glaxo Laboratories, Greenford. He continues to be the head of pharmaceutical manufacturing and packing departments.

*

At the annual meeting of the Leeds Chamber of Commerce, Mr. C. W. Banks, chairman and managing director of British Fish Canners Ltd., was duly installed President of the Chamber in succession to Mr. Geoffrey Hirst, M.P. for Shipley.

*

Mr. F. W. Robinson, managing director of Bell and Hadden and Bell and Hadden (Produce Merchants), has retired from both companies for health reasons and has been succeeded by Mr. J. A. V. Macy, who has been employed by both companies as a director.

*

Following the expansion of baking and distributing the small wrapped loaves in Kent and the London area, Procea Products have appointed Mr. F. T. Capps, sales manager of the company's depot at Colnbrook; Mr. N. Redway, depot manager at Colnbrook; and Mr. F. A. Marshall, sales and depot manager at Chatham.

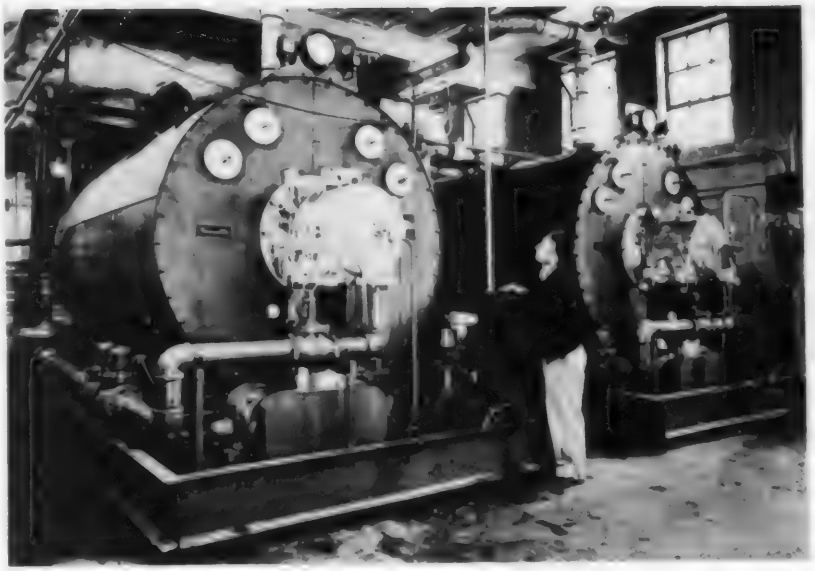
*

The appointment of the following agents is announced by Autopack: Mr. John Deas, 11, Lynedoch Crescent, Glasgow, C.3, and Mr. R. R. Britton, Memorial Road, Hanham, nr. Bristol.

This further representation in Scotland, South Wales, and South-west England will greatly extend their coverage and improve the sales and service facilities in these areas.

Change of Address

The Newcastle-on-Tyne sales office of Brook Motors is now at 35, Pink Lane. The telephone number remains the same, Newcastle 26763.



Typical installation of two 250 h.p. light oil/gas combination Powermasters serving a hospital.

Automatic Packaged Boiler

A completely self-contained packaged boiler suitable for either oil firing, gas firing, or a combination of both fuels is being marketed by G.W.B. Furnaces.

The boiler, marketed under the registered name of Powermaster, is of the super-economic, horizontal fire tube type with three pass gas travel, and is available with steam outputs from 517 to 17,250 lb./hr. The hot gases pass through the central cylindrical combustion tube to the rear, and then reverse through the lower bank of tubes, to the front.

The boiler complete with all ancillary equipment necessary for successful operation, including burner equipment and automatic controls, is delivered mounted on a strong steel base. No special settings or foundations are required and the unit, being already interpiped and interwired, requires only the fuel, water, electricity, and steam connexions to be made to render it capable of immediate operation.

In the Powermaster oil fired unit, the heating system consists of the Voriflow air atomising oil burner. Fuel oil flows through the central tube of the burner and is picked up at multiple injection points by individual air streams. Only about 1 per cent. of the total full load combustion air is admitted with the oil for atomising, ensuring a high efficiency during light loads.

All necessary equipment for automatic and safe operation is fitted to every Powermaster, including low water cut-off, draught fan interlock, excess pressure switch, excess temperature switch, and automatic combustion control. Once pre-set and put into operation, the boiler will function with only occasional attention for checking purposes.

Company Reorganisation

As part of the reorganisation of the industrial side of The Distillers Company, which was initiated on March 31, 1953, The Carbon Dioxide Company ceased to trade as a separate company on April 1, 1954.

Following this change of constitution, the business will be conducted in the name of "The Carbon Dioxide Company—A Division of The Distillers Company Limited."

Deep Drilling for Natural Gas

Deep drilling for natural gas has begun at Cousland, near Dalkeith, Midlothian, Scotland, as part of the Gas Council's five-year search. The presence of natural gas in this area is known as a result of borings made before the war, but further drilling is necessary to establish the extent of the reserve. This is the first deep drilling to be undertaken by the D'Arcy Exploration Company on behalf of the Gas Council, although preliminary survey work has been proceeding for some weeks in Yorkshire, Lincolnshire, and Sussex.

A 25th Anniversary

On the occasion of their 25th anniversary, the British Hydrological Corporation gave a cocktail party at the Savoy Hotel on March 30.

As a result of research over the last 25 years into conditions of water supply, machine grease, deposit, scale, bacteria, mould, and yeast, the company are able to offer a wide range of detergents and degreasants to meet the needs of each individual customer.

One of the main developments in this field has been the production of quaternary ammonium compounds which are now used widely in the bottling and food industries.

BOOKLETS RECEIVED

"Pumps for all Industries" is the title of a new illustrated leaflet issued by Girdlestone Pumps.

▪

A booklet published by Accles and Pollock in both English and French is entitled "Composite Tubing."

▪

Details of the new backward bladed fan with aerofoil section blades are given in a new leaflet issued by Musgrave and Co.

▪

Recipes for invalids, adults, and infants are included in the new Trufood cereal booklet. This cereal food has a neutral flavour and, because it is precooked, is easily digested.

▪

A booklet concerning the new series of Teepol advertisements prepared for Shell Chemicals by Crawfords has been issued. The text and illustrations by Geoffrey Salter, representing 30 variations on the theme "Here! Clean right through with Teepol," are addressed to 10 different types of user.

▪

Practical advice to students who will later on be making displays in their own shops is contained in "Window Display." Written by H. Thornton, lecturer at the Beeches College, Bournville, the book deals specifically with the grocery and confectionery trades and is priced at 5s.

▪

In order to provide for those firms who prefer using the Imperial system of weights and measures instead of the metric system, the adoption of which has been recommended by the Association of British Pharmaceutical Industry, Howards of Ilford, in their new price list of fine chemicals, have quoted in terms of both systems.

▪

The purpose of the booklet "Successful Case Sealing," published by National Adhesives, is to assist users of corrugated and solid fibre containers in improving their sealing work, and in making the most of their investments in equipment and supplies for the shipping department.

▪

Ten articles with attractive illustrations and dealing with a variety of subjects are contained in the latest issue of "The Bowater Papers." Of particular interest to the food industry are the articles "Package and Prestige" and "The Hygienic Sack," the latter focusing attention on food preservation and protection against pests and other hidden forces of contamination.

OBITER DICTA

● Probably more nonsense is talked and written about food than about any other subject.—*"Bakers' Review."*

● Cream has become the product of the manufacturer's art and a positive insult to the cow.—*Bucks. County Analyst.*

● What does Mr. Butler eat? Not, I hope, his own statistics; they are most indigestible.—*Sir Hartley Shawcross, M.P.*

● The packet breakfast cereal has knocked the traditional bacon and egg breakfast for six.—*Major E. K. Edwards.*

● If we slip on a banana in the roadway it is a road accident; if it is on the footpath, it is not.—*Mr. E. Y. Bannard, senior official of the Ministry of Transport.*

● Before the war, heavy manual workers liked rather salty butter, but sweeter stuff was sold for the less energetic south.—*"Manchester Guardian."*

● The salmon sojourns in the rivers, but it emerges from that journey a physical wreck, no doubt an object of derision to the cod.—*T. S. Gorie, writing in "The Scotsman."*

● The Minister of Food very often mistakes the letters, "M.O.F." for "Ministry of Figures" because he is much fonder of wangling figures than of arranging for the distribution of food in this country.—*Mr. G. Jeger, M.P.*

● People in Lancashire buy jelly babies themselves to eat, whereas in London, adults buy jelly babies almost exclusively for their children.—*"Ambassador," writing in the "Confectionery Journal."*

● A fig for the night baking Bill; here is frozen bread—very old and very cold. "Eureka, Eureka!" cries the plant baker; he has found it indeed—refrigeration, the solution to all his problems.—*"The British Baker."*

● The professor of nutrition is beginning to realise that people will listen to him more easily if he shaves off his beard, leaves his rats in his laboratory, and talks more about food, cookery, taste, and menus, and less about the abstruse actions of vitamin B_c on carbohydrate metabolism.—*Prof. John Yudkin.*

A new leaflet, issued by Phillips Electrical, deals with the prevention of dough mould in bakery processes by the use of a germicidal ultra-violet tube installation. Dough mould is a fungus which forms upon the small dough particles clinging to the cloth pockets of bakery prover conveyor belts. Continuous irradiation, by ultra-violet rays, of both surfaces of the moving pockets effectively prevents dough mould from forming.

ERECTIONS AND EXTENSIONS

Smith's Potato Crisps (1929), Ltd., are planning to erect a new factory on a site off Godinton Road, Ashford, Kent.

▪

Another factory at Aspley, Huddersfield, has been taken over by Brock Motors. A further floor area of nearly 20,000 sq. ft. will thus be made available for the manufacture of electrical stampings.

▪

The purchase of premises in Berkeley Avenue, Reading, is announced by M. Venner and Sons. The site covers approximately 1½ acres, and will be used for the firm's wholesale provision and grocery business, which is to be transferred from Southampton Street.

The transfer will enable the premises at Southampton Street to be altered and improved to cope with the expanding demand for the firm's products, including sausages and cooked meats.

Record Sugar Production Figures

All previous production records have been broken by the Ely Sugar Factory in a campaign which has just ended. The factory dealt with a total of 368,000 tons of beet, the nearest comparable figure to this being the 370,000 tons received in 1950-51, but in that year the factory took three weeks longer to deal with that amount and sliced 400 tons a day less than in 1953-54.

During the recent campaign, sugar production of 53,000 tons was easily an all-time record, and dried pulp and molasses production amounted to 26,600 and 5,800 tons respectively.

An important new development at the factory in the past year is the supply of electricity to the grid during the operating season; during the last campaign over 600,000 units were passed into the common pool. A new elevated roadway has also been added which has proved of great help to growers and hauliers with tipping lorries.

For the majority of growers, the season has been a good one. Average sugar content of 13·76 per cent. was below last year's, but the yield per acre of 13 tons created another record.

Food Equipment at the B.I.F.

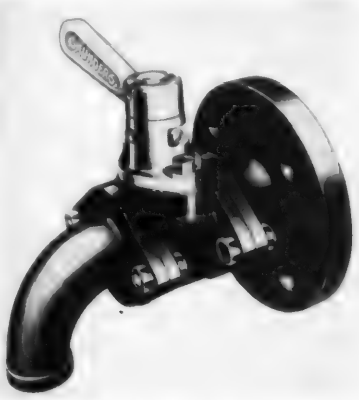
BIRMINGHAM

Valves and Pumps

A wide range of diaphragm valves will be shown by the Saunders Valve Co. (Stand D. 125).

Development is continuous, whether it be in the form of new sizes as the 7 in. and 9 in. handwheel models, or the 5 in. pressure opening valve, new material specifications as the ebonite series, or the extension of diaphragm grades to cope with the ever-extending range of industrial fluids.

Examples of the new ebonite valve, with body, bonnet, and handwheel of uniform specification, will be shown. The three simple units, body, bonnet assembly, and diaphragm, are interchangeable with units of different



Saunders M cock flanged, bib end type.

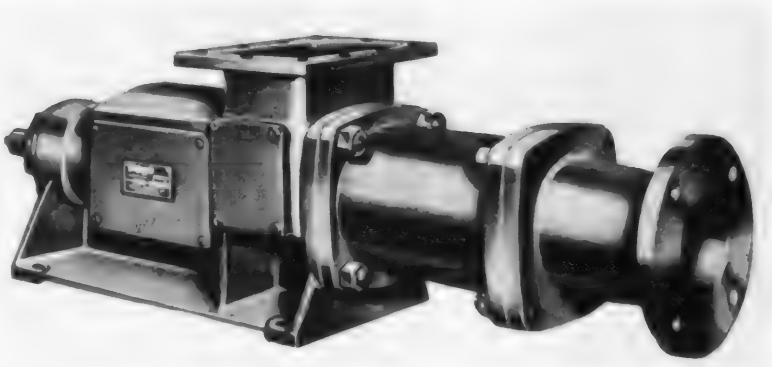
specification so that where internal protection is adequate for the service, the less expensive cast iron bonnet and handwheel can be fitted. Alternatively, where a glass- rubber- or lead-lined valve with non-corrodible bonnet assembly is preferred, this combination is now available from stock parts.

The range of Safran centrifugal pumps, in eight sizes, is now extended by many adaptations for special purposes and by the introduction of a series of multi-stage and vertical trunk pump models. Examples of both types are to be exhibited, together with the automatic self-priming (reflux) pump with petrol engine (Villiers) power unit.

Self-contained electric, petrol, and Diesel drive units will be on view and technical staff will be in attendance to discuss any specification variations needed to meet special conditions.

*

Among the pumps to be demonstrated by Mono Pumps (Stand 716) will be one capable of handling dry materials by pumping a powder in a piped circuit within the confines of the stand. On duties involving limited horizontal travel or upward lift of a few feet, fluidisation by air



The DM 12 Mono pump for handling dry materials.

injection may not be essential, but on longer runs of piping, assistance from injected air is essential to help control the powder and keep it in a fluidised state to relieve friction between particles and within the pipeline during flow. The demonstration on the stand shows how a small quantity of injected air is used to fluidise the powder. The use of air is kept within very low limits and it is emphasised that it is not used for the purpose of blowing the powder through the pipe.

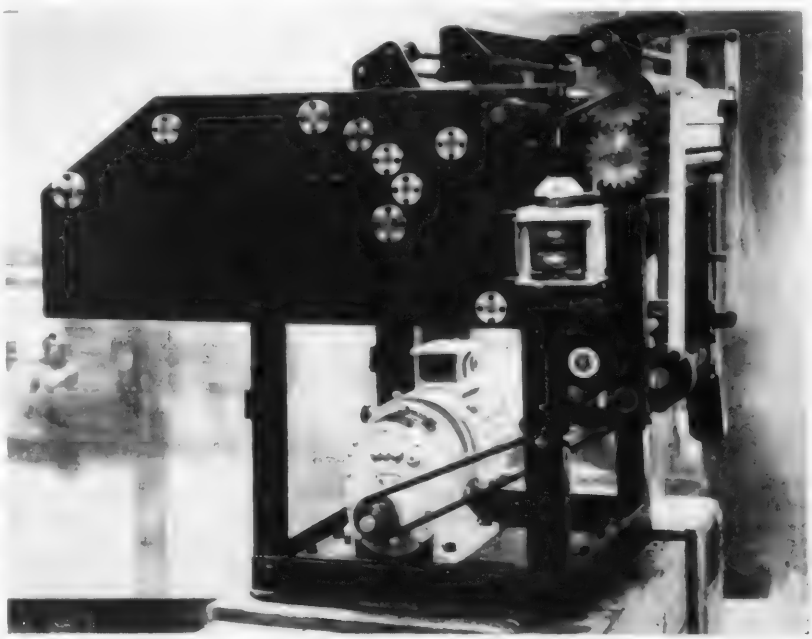
For this pump, a 5 h.p. motor is sufficient to cover the full range of duties and it therefore presents itself as an economical unit for the type of duty it undertakes. Capacities depend upon the density of the powder being handled, but an indication of the capacity of the pump can be given as three to five tons per hour.

Applications covering the conveyance of cereals or the product of cereals for human or animal consumption are under joint development with Henry Simon of Cheadle Heath, Stockport, who have the sole marketing rights for this type of pump.

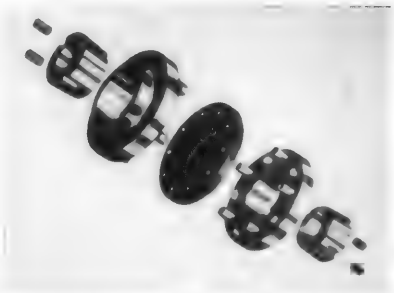
Another working unit will demonstrate the handling of moist pulped material, such as fruit pulps, jam containing whole fruit, and peas suspended in water,

Domestic Hardware

A complete range of domestic hardware marketed by The Metal Box Co. under the brand name Worcester Ware is to be exhibited (Stand A. 527/422). Special emphasis will be given to the latest designs as well as to some of the newer fancy goods items which the company is now manufacturing as an extension of its hardware business.



A Kopp Speed variator of the type illustrated above will be among the exhibits of Allspeeds Ltd. (Stand D.257).



Exploded view of the new Fenner Taperlock flexible coupling.

V-Belts and Pulleys

Two new products are to be exhibited by J. H. Fenner and Co. (Stand D. 406). These are the Taperlock flexible coupling and the Mark 2 Hainsworth variable speed belt. In addition to these, the company will also be showing the whole range of V-belts and Taper-lock pulleys.

Oil Burners

Covering an area of over 2,000 sq. ft., the Brockhouse organisation (Stand D. 405/304) will provide the usual comprehensive display of products from the factories of the Group.

One of the Brockhouse companies represented will be the Brockhouse Heater Co., who will exhibit oil burners with a range of ratings from 75,000 B.T.U.s per hour (19,000 calories) to 3,250,000 B.T.U.s per hour (820,000 calories). This is a new type being shown for the first time.

Magnetic Equipment

A representative cross section of their permanent and electro-magnetic equipment is to be shown by Rapid Magnetic Machines (Stand C. 421).

A new addition to the range of swarf separators will be exhibited, also the Multi separator for treating the more complex swarf, scrap, etc.

Other exhibits will include a portable foundry separator, an electro magnetic ore separator, a 20 in. diameter lifting magnet, the patent flux controlled chute, a smaller and completely new self-cleaning magnet, the Magnahump and Magnatrap, which are for inclusion in gravity, pneumatic or hydraulic ducts, pipelines, etc., and are essential where tramp iron is to be removed from liquid, semi-liquid, or dry fibrous products, electro and non-electric self-cleaning drum and pulley type separators, and electro magnetic clutches and brakes for power transmission or arrestation.

A new separator designed to treat fine powders and other commodities of a similar consistency that require mechanical motion to precipitate their flow will also be displayed.

Industrial Plant

A comprehensive selection of the products made by G. A. Harvey and Co. (Stand B. 329) will be on show.

The range of perforated metals exhibited will demonstrate the innumerable patterns needed for all kinds of sifting, filtering, and grading such diverse materials as coal, stone, cereals, food products, and chemicals.

Another production is the special quality wire screen used for vibrators. This screen gives a far longer life in service under the most exacting conditions than ordinary mild steel.

Sheet metalwork is a trade in which the company has specialised since it was first established, and examples of this type of workmanship will include mild steel rainwater goods, galvanised tanks, cisterns and cylinders, ventilators, and cowls.

Rapid vibratory electro magnetic separator for the treatment of fine powders.

The Chemical Industry

Twenty of the leading chemical companies, each with separate display units, will show their exhibits on the stand of the Association of British Chemical Manufacturers (Stand C. 617/516).

Included among these will be Albright and Wilson, whose display will be entirely devoted to silicones; W. J. Bush and Co., who will be exhibiting a selection from their range of aromatic, fine, and pharmaceutical chemicals; and The Distillers Company, who will outline some of the ways in which the company has recently contributed to the activities of the British chemical industry. Imperial Chemical Industries will show by means of diaromas the part played by the company's chemicals in agriculture, in the health services, and in industry. Products and themes chosen for display by Monsanto Chemicals are Lustrex polystyrene for industrial plastic mouldings, Aroclors as capacitor impregnants and heat transfer media, Pyroclor as a transformer fluid, Silesters (organic silicon chemicals for use in the foundry trade), Permasan and Permasan 116 for use in wood preservation, and sodium benzoate for corrosion inhibition. The Shell exhibit will be devoted to the new Epikote resins which are of particular interest to formulators and users of surface coatings and in the plastics and adhesive fields. In addition to citric acid, John and E. Sturge will be making a special feature of their newly developed grades of precipitated calcium carbonate for use in the plastics, paint, and paper manufacturing industries.

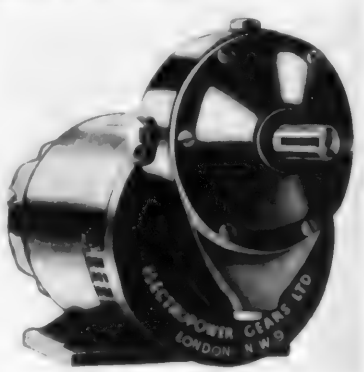
Motors and Control Gear

A new 350 h.p. drip-proof motor and a selection of the BS.42 fractional horse power machines, giving ½ h.p. on three phase supply with slightly lower powers on single phase, will be shown by Brook Motors (Stand C. 304).

The 350 h.p. motor has an arrangement of loose louvres over the ventilation ports in each endshield, which can be rotated through 90 degrees, affording drip-proof protection in any mounting position. Cartridge bearing housings which enable the motor to be dismantled without disturbing the bearings are among special features. The rotor is mounted centrally in the stator and the endshields are identical, so that the rotor can be reversed if connexions are required from the other side. Brush lifting and short circuiting gear with electrical interlock is fitted as standard.

The BS.42 type fractional is smaller in size than the Gryphon motor and has a good "power for size" ratio to meet the modern need for compactness in small industrial and domestic appliances. They are available as protected or totally enclosed, for flange or face mounting, with or without feet.

Control gear from the Brook range of automatic and hand-operated types and various standard industrial and Gryphon fractional h.p. motors will complete the display.



Electropower Gear units, similar to the one illustrated, will be fitted to various types of food and other equipment to be shown at the Fair.

Steel in Industry

A general survey of the products of the United Steel Companies will be available (Stand D. 519/416) in the form of external display murals, constructed of actual material in a variety of forms, manufactured by each branch. Models in abstract form will indicate products covering the main field of activities in the industry, and the general story of The United Steel Companies Limited will be portrayed by means of colour photographs forming the murals for the interior of the stand.

Steam Raisers

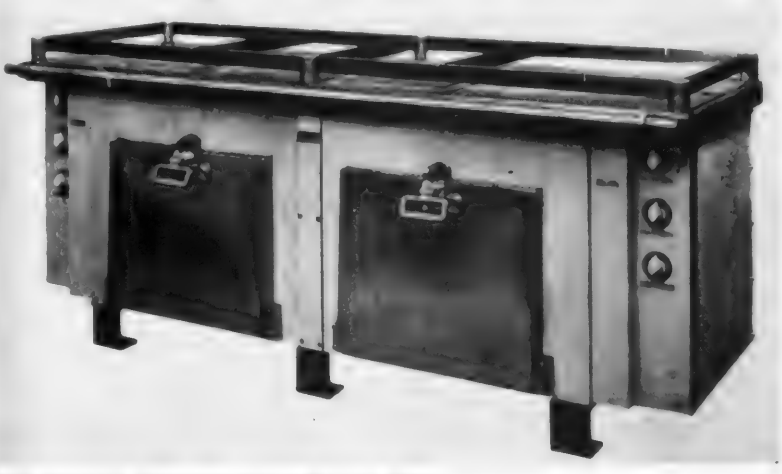
Electric heating or melting furnaces will not be exhibited this year by G.W.B. Furnaces, who will be concentrating on showing Autolec electrode type steam raisers and water heaters and, in particular, the Powermaster oil- or gas-fired boiler (Stand C. 321). Completely automatic in operation, this boiler is entirely smokefree and operational efficiencies in excess of 80 per cent. are obtained with full range combustion modulation control giving the correct fuel/air ratio over any load.

Galley Ranges

Although the company's services to shipbuilding and the shipping companies will be the principal theme of the G.E.C. exhibits, many of the items selected are of wide industrial application.

For example, they will be showing (Stand C. 503/402) two galley ranges, one for D.C. and one for 440 v. A.C. supplies. The D.C. range is a double-oven type specially designed for the smaller type of cargo vessel with a complement in the region of 40 men.

The A.C. range contains three ovens, each of which is heated by sheathed wire elements with thermostatic control. Two 16 in. × 12 in. hotplates are mounted over each oven and have Simmerstat control.



G.E.C. two-oven galley range for small cargo ships.

Five hundred gallon Butterfield mixing vessels in operation.

Food Processing

Among the exhibits of W. P. Butterfield (Stand D. 535/432) will be a stainless steel jacketed boiling pan, with stainless steel agitator and breakers, complete with the necessary motor for driving the agitator.

Flooring and Mechanical Handling

The exhibits of the Material Handling Division will be housed in Fisher and Ludlow's own exhibition building (Outdoor Site No. 1318). The working exhibits will be overhead chain conveyors, floor conveyors, belt conveyors, portable conveyors, gravity conveyors, and the Fisholow-Hapman tubular *en masse* conveying system.

The company's wide interest in the industrial equipment field will be represented by a comprehensive display of many varieties of steel pallets.

In the works equipment field will be shown mobile steel shelving, clothes lockers, and the latest development in adjustable steel shelving.

Open grating flooring systems in steel and aluminium, and also the latest developments in demountable storage platforms, with open or solid floors, will be exhibited, together with a universal slotted angle system, not only in the form of work tables, racks, etc., but actually forming the roof of the building.

*

Forklift trucks capable of lifting 10 cwt., 30 cwt., and two tons will be included in the exhibits of Ransomes, Sims and Jefferies (Outdoor Stand 1317/1216). Various attachments will be exhibited, including a crane attachment, load guard, overhead guard, 4 ft. 6 in. fork extensions, and also the Hydrum load clamp with drum arms.

Other exhibits will include tractors, battery chargers, and a runabout crane for the handling of goods and material in railway stations, goods yards, sidings, warehouses, and factories. This crane has a capacity of 25 cwt. at 12 ft. 9 in. radius.

The company's indoor display (Stand A. 502) will be devoted to lawn mowers.

Ventilation Equipment

Natural and powered ventilation equipment for industrial and domestic purposes will be exhibited by Colt Ventilation (Stand B. 506).

This year's stand has been designed to emphasise the application of their equipment for light and heavy industry. Some interesting photographs will be shown of some of the 2,164 industrial installations completed in the past 12 months; these include ventilation for new power stations at home and overseas, large industrial development schemes, Ministry of Supply factories, and 372 new factories in which Colt equipment has been specified at the design stage.

Ranging from the small clear-opening ventilator having an extract capacity of 100,000 cu. ft. per hour, to the giant S.R. ventilator handling up to 3,000,000 cu. ft. of air per hour, all equipment has been designed to

A selection of some of the items now falling within The Metal Box Company's range of products.

allow easy fitting into existing premises without any structural reinforcement.

On the same stand will be shown a Colterro clay lath, a base for ceilings, domes, and inside and outside walls. This product is a strong and pliable coppered wire mesh with clay crosses electrically-kilned on at the intersections, providing an immediate and unbreakable "key" with the mortar, cutting out wastage of the rendering through droppings. This plaster base, when tensioned and fixed, is absolutely rigid for the plasterers to work on and prevents temperature cracking and pattern staining.

OLYMPIA

Metal Detection

Specialists in the field of industrial metal detection, Loma Electronic Equipment will be displaying a range of their Metaltector equipment (Stand B. 27).

This equipment affords completely automatic inspection for the detection of metal—ferrous or non-ferrous—in any non-metallic material. The product to be inspected passes through the detecting head aperture and when a small metal particle embedded in the product enters this, the control unit reacts, operating a control relay to give visual and audible warning, stopping the conveyor band, and/or dropping a marker on to the band. The position of the offending metal is thus localised and can be removed by hand or diverted. Special ejection systems can be fitted so that contaminated products can be diverted without stopping production.

Another model to be displayed incorporates many improvements in construction, giving greater elasticity in application as each unit is completely independent and installation can be made at varying points to suit the particular site.

Gelatin Capsules

Gelatin capsules, manufactured by the rotary die process, will be shown by R. P. Scherer (Stand 11) in the British North Greenland exhibit.

Capsules of chicken fat for soup mixes, capsules of flavouring essences, and other types of interest to the food manufacturer will be included in the display.

Packaging Accessories

A selection of packages and packaging accessories will be displayed by The Metal Box Co. (Stand F. 4), particular prominence being given to some of the latest products to come within the company's range. These include flexible packages, special containers in foil and film laminations of all kinds, and plastic caps and closures.

Office Furniture

An entirely new range of steel desks and tables, designed on the unit principle, will be presented by G. A. Harvey and Co. (Stand G. 36).

Other exhibits will include filing cabinets, steel plan cabinets, card index cabinets, cupboards, clothes lockers, stationery cabinets, waste paper tubs, book and letter racks, letter trays, and adjustable storage bins and shelving.

EARLS COURT

Corrugated Fibreboard

The development of the special weatherproof corrugated fibreboard containers used so successfully on the Everest Expedition will be depicted by The Thompson and Norris Mfg. Co. (Stand 14).

The use of this type of corrugated fibreboard, under the registered trade name of Kraftexa, is now being extended to the commercial market. Until recently it was restricted for use in the manufacture of containers against Government contracts but this restriction has now been lifted.

The company will be showing the type of case actually used on the Expedition, together with the latest commercial developments. Among these is a new type of patent returnable case supplied to A. Probyn and Co. This case has been designed to hold 24 × ½ pint bottles of beer, but it can be constructed to take any number of bottles to meet individual requirements.

Another part of the display will display a selection of cases manufactured with a linen finish, which transforms the normal fibreboard into an attractive packaging medium.

Thompson and Norris corrugated fibreboard containers as used for the Everest Expedition.

World Food News

FORTHCOMING EVENTS

Food Technology Convention

The national convention of the Institute of Food Technologists is to be held in Los Angeles from June 27 to July 1 inclusive.

*

Sweden's International Fair

For the third year in succession, Britain will have her own Pavilion at the 12th St. Erik's Fair to be held in Stockholm from August 28 to September 12.

*

Lille International Trade Fair

Occupying a superficial area of about 240,000 sq. yd. of which 96,000 sq. yd. includes covered halls, the Lille International Trade Fair will be held from May 1 to 16.

It is anticipated that about 3,500 exhibitors will be present, representing firms of 15 different nations. Special facilities and reductions in railway fares, and air and sea transport are to be granted upon presentation of the Fair Identity Card, issued by the Fair authorities, French Consulates, and the principal travel agencies.

*

Gastronomy and Tourism

An International Exhibition of Gastronomy and Tourism is to be held in Munich from September 11 to 26. Organised by German associations of the hotel, catering, and confectioners' trades in co-operation with corresponding associations abroad, European tourist associations, and allied organisations, the exhibition will provide examples of European culinary art and will comprise exhibits of catering and kitchen equipment, international pastries and confectionery, bakery equipment, and those exhibits of interest to the mineral water industry.

The last date for applications for floor space from U.K. and Commonwealth exhibitors, to be made to M. Neven du Mont, 123, Pall Mall, London, S.W.1, is June 30.

*

Congress of Industrial Chemistry

The 27th International Congress of Industrial Chemistry is to be held in Brussels from September 11 to 19, 1954.

As in previous years, the programme will include many items in addition to the plenary conferences, such as sectional meetings, visits to works in Belgium's principal industrial centres, and a number of excursions.

The Congress will include 29 sections grouped under the following main headings: General Problems of the Chemical Industry; Fuels; Nuclear Science; Metallurgy; Industrial Inorganic Chemistry; Cements, Building Materials, Glassware, Ceramics, Enamels; Industrial Organic Chemistry; Foodstuffs and Agricultural Industries; Colonial Problems; Organisation: industrial, commercial, and professional.

The President of the Congress is M. E. Solvay; M. F. Boudart, President of the Belgian Federation of Chemical Industry, is chairman of the organising committee; M. C. J. Guillissen, Professor at Brussels University, is presiding over the scientific committee; and M. A. Guilmot, director of the Belgian Federation of Chemical Industry, is chairman of the executive committee.

Full particulars of the Congress may be obtained either from the Secrétariat du Comité d'Organisation, XXVIIème Congrès International de Chimie Industrielle, 32 Rue Joseph II, Brussels, or from the Commission permanente d'Organisation des Congrès de Chimie Industrielle, 28, Rue Saint Dominique, Paris 7°.

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Congress of Fruit Juice Producers

The Programme of the 3rd International Congress of Fruit Juice Producers, to be held in Madrid on June 1 and 2, 1954, has been provisionally arranged.

Within the framework of the 10th International Congress of Agricultural and Food Industries, on the afternoon of June 1, accounts will be given of the results obtained by the International Federation of Fruit Juice Producers.

MM. Eggenberger (Switzerland), d'Eaubonne (France), Borgstrom (Sweden), Kreiss (France), and Ryf (Switzerland) will present the reports with which they have been assigned.

Under the Presidency of Prof. Lavollay of the Conservatoire National des Arts et Métiers of Paris, Dr. Patron of the Institut des Fruits et Agrumes Coloniaux will present a paper on "Non-enzymatic Oxidations." Dr. Luthi of the Federal Experimental Station at Wadenswil (Switzerland) will discuss "Enzymatic Oxidations."

The second day will be devoted to the presentation of papers on the following subjects: "Fruit Juice Concentrates"; "Tolerance towards Apple Juice" by Dr. Bucher (Switzerland); "Production of Citrus Juices" by Prof. Bottini (Italy); "Control of Quality in Fruit Juices" by Dr. Julius Koch (Germany); "Measurement of the Densities of Fruit Products" by M. Dupaigne (France); "Fruit Juices in Dietetics" by Prof. Antoniani (Italy).

The Congress will be preceded by reunions of the Direction Committee of the International Federation of Fruit Juice Producers and of the Council of the Federation. It will be followed by a dinner for all participating members.

Those proposing to attend the Congress should communicate with The Apple Juice Producers' Association of Great Britain, 8/9, North End, Wisbech, Cambs., who will furnish all necessary information.

Food Mission to Australia

A food technology mission, comprising Dr. C. M. Ishaq and Mr. M. S. Roghani (Pakistan) and Mr. Harsono Hardjohutomo (Indonesia), has visited various establishments concerned with the growing, handling, and preservation of food in New South Wales and Queensland.

After attending the annual conference of the Australian and New Zealand Association for the Advancement of Science in Canberra, where food technology was an important subject of discussion by leading experts in this field, the mission visited canneries, attended meetings with canning machinery manufacturers in Victoria, South Australia, and Tasmania, and inspected vegetable and fruit producing areas in those States and New South Wales.

The Pakistani members of the mission went to Australia in consequence of the recommendations made by an Australian mission who visited Pakistan in 1951, under the Colombo Plan, to look into food processing in that country. Mr. Harsono joined them on arrival.

Mr. Harsono explained that he had come to Australia at the invitation of the Australian Government under the Colombo Plan. He said that food canning was not practicable in Indonesia at present because tinplate for the purpose was unavailable. Substitution of earthern pots for cans had been attempted, but difficulty had been experienced in sealing them adequately.

Similar difficulty had occurred with glass jars made in Indonesia. He hoped it might be possible to arrange for Australia to supply suitable jars and for Australian canning machinery to be imported to Indonesia.

He emphasised that while there existed great scope for food processing in Indonesia, the processes must be easy and inexpensive, thus enabling the mass of people to benefit by them.

India Seeks Synthetic Rice Plant

The Indian Government is to place an order abroad for a plant capable of producing one ton of synthetic rice per day. It is hoped to put the plant into operation by next September. The product is to be made available in selected areas where its nutritional properties will be tested.

Tea and Coffee Plant Expansion

A new £300,000 warehouse and tea and coffee packing plant, established by Bushells Ltd. in Berwick Street, Fortitude Valley, Brisbane, Queensland, was recently opened by the State Premier, the Hon. V. C. Gair. The new factory, stated to be the most modern of its kind in the Southern Hemisphere, is capable of supplying Queensland's tea needs.

Irish Exports to Britain

Food exports from the Republic of Ireland to Britain increased in value from £26,293,000 in 1945 to £82,173,000 last year.

Significant changes between 1945 and 1953 contributing to the increase were those for fat cattle from £300,000 to more than £2,000,000; store cattle, £12,000,000 to £21,000,000; carcass meat from £400,000 to £10,500,000; bacon and ham from nil to £1,400,000; poultry and rabbits from £2,000,000 to more than £4,000,000; canned meat from £2,000,000 to nearly £4,000,000; eggs from £2,500,000 to £3,800,000; cocoa milk crumb from nil to nearly £8,000,000; and chocolate and sugar confectionery from £72,000 to more than £10,000,000.

Food Studies by Asians

The handling, transportation, and preservation of food after it leaves the producer is being studied by about 30 Asians who attended the annual conference of the Australian and New Zealand Association for the Advancement of Science in Canberra, in January, 1954. Some of these Asians are taking a course of advanced education in food technology at the New South Wales University of Technology, Sydney.

Dr. F. H. Reuter, Associate Professor of Food Technology at the University's School of Chemical Engineering, who also attended the conference, has been closely associated with the development of plans under which these students are in Australia.

The course covers the fundamentals of biochemistry, food chemistry, bacteriology, and engineering in its first year, and chemical engineering and food technology in its second year. Inspections are made of Australian food processing industries and the students are given some actual working experience in these industries.

The university aims to provide in the course a broad basis of training, rather than to turn out specialists in any one branch of food technology. It is considered that knowledge of chemistry, biology, and engineering is necessary for the management of food, and that neither subject alone provides the knowledge necessary. The three are therefore combined, as in the United States of America, as food technology.

Strawberry jam in plastic pack.

Jam and Jelly by the Ounce

Individual packs in Vinylite plastic for jellies, jams, cranberry sauce, honey, and table syrup are now being produced by Kraft.

The jellies and jams are packed in half and one ounce sizes; honey, cranberry sauce, and table syrup are in three-quarter ounce sizes.

The sealed closure has an overflap extending over the edge of the package, permitting easy removal by the consumer.

The packs are used mainly in restaurants and hotels, although they can also be used domestically.

Kitchen Robot

The prototype of a new kitchen "robot" has been produced by the Zugló factory in Hungary. Intended for use in canteen kitchens serving up to 600 meals a day, it can do the work of 10 kitchen hands.

This includes kneading dough, slicing marrow, sieving tomatoes, making whipped cream, and grinding walnuts at the same time. It can also mince meat, grind poppy seeds and coffee, and make breadcrumbs.

OVERSEAS ENQUIRIES

Agency for Food Products

Distributors Ltd., 44, Port Royal Street, Kingston, British West Indies, have expressed interest in representing United Kingdom manufacturers of confectionery, biscuits, fine salt (in bulk), and baking powder.

United Kingdom firms who are interested in this enquiry are asked to write direct to Distributors Ltd., giving full details of the products which they have to offer.

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Cocoa Powder and Cocoa Cake

Mr. W. G. Wolfe, Cook Chocolate Co., 4825, South Rockwell Street, Chicago 32, Ill., is interested in contacting United Kingdom firms who are able to offer cocoa powder and cocoa cake.

United Kingdom firms interested in this enquiry should write direct by air mail to Mr. Wolfe at the address given above, submitting full particulars of their products. Prices should be quoted in U.S. dollars c.i.f. Chicago by direct steamer by Great Lakes.

■

Catering and Butchery Equipment

Domino Refrigeration and Appliances Ltd., of 500, Davie Street, Vancouver 2, would like to represent United Kingdom manufacturers in respect of restaurant, bakery, and butchery equipment, including such items as electric meat saws, slicers and grinders, sausage making machinery, and meat blocks.

Interested manufacturers are invited to communicate direct, by air mail, with the company, sending quotations in dollars c.i.f., trade literature, and delivery dates.

■

Fruits and Allied Colonial Products

Bösch and Lassen, Hamburg 8, Bei den Mühren 70, are interested in increasing their trade with United Kingdom firms exporting fruits, dried fruits, pulses, honey, seeds, canned fruit, fruit juices, rice, and allied Colonial products.

United Kingdom firms interested in this enquiry should write direct to Bösch and Lassen at the address given above, submitting full particulars of their products and prices c.i.f. Hamburg.

■

Jams and Marmalades

Purity Factories Ltd., Hamilton Street, St. John's, Newfoundland, wish to be put in touch with United Kingdom manufacturers of cheap jams and marmalades with a view to securing an agency for these products in the Province of Newfoundland.

The Newfoundland firm have been operating for some 30 years and they are manufacturers of jams, biscuits, confectionery, and soft drinks.

United Kingdom manufacturers who are interested in this enquiry should write direct by air mail to Mr. C. H. Davies, Messrs. Purity Factories Ltd., at the address given above, submitting details of their products and their lowest possible prices c.i.f. Newfoundland.

All foodstuffs destined for the United States are subject to the United States Food and Drugs Administration Regulations.

A "Fishy" Story

A Norwegian publishing firm is to bind 40,000 copies of a new book in fish skins prepared by a special process at a factory in North Norway. The processed fish skins are claimed to be a satisfactory and economical substitute for ordinary leather.

Britain's Meat

Australia's Acting Commerce Minister, Senator George McLeay, has stated that the Australian delegation which recently returned from Britain after negotiations with the British Ministry of Food had discussed a revised series of minimum meat prices for 1954-55. He stated that the delegation had been advised that private traders would be permitted to import into the U.K. mutton and lamb shipped from Australia on and after July 1, 1954. In the case of beef, veal, and pigmeat, a similar agreement would apply on and after October 1, 1954.

In the meantime, the British Ministry of Food would continue as the sole U.K. purchaser from Australia of mutton, lamb, veal, beef, and pigmeat and their corresponding offals. Any of these classes of meat, if intended for export to the U.K., would be purchased by the Australian Meat Board at the current Commonwealth Government purchase price for shipment to the Food Ministry.

New Zealand producers had nothing to worry about as far as a future market for their meat in Britain was concerned, according to Mr. John D. Ormond, chairman of the New Zealand Meat Board. He was speaking in Auckland on his return from London after talks with the British Ministry of Food concerning bulk purchasing.

"The British public has sufficient purchasing power to absorb all the meat New Zealand can produce and at a price satisfactory to the farmer," he stated.

News from the Ministries

Appointment and Retirement

Sir James Scott Watson, C.B.E., LL.D., D.Sc., Chief Scientific and Agricultural Adviser and Director-General of the National Agricultural Advisory Service in the Ministry of Agriculture and Fisheries, will retire from the public service at his own request on December 31 next.

Prof. H. G. Sanders, M.A., Ph.D., Professor of Agriculture, Reading University, has been appointed to succeed Sir James Scott Watson.

Danish Egg Imports

Agreement has now been reached with the Danish Egg Export Committee that the contract with the Ministry of Food will end on June 30, 1954, instead of at the end of September. From July 1, imports of Danish eggs will revert to private trade, but between July 1 and September 30 the difference between the prices actually realised and the contract prices (on an f.o.b. basis) will be shared between the Ministry and the Danish Egg Export Committee.

The Danes will still be required to ship at least two-thirds of their exportable surplus to the U.K. until September 30.

Oilseeds, Oils, and Fats

Private imports of all oilseeds and vegetable oils will be resumed on June 1, 1954, after a break of 15 years.

From that date traders will be able to buy freely most types of oilseeds and vegetable oils, as well as margarine and cooking fats, from any source of supply.

It is likely that after June 1, the Ministry of Food will still be importing oilseeds and oils shipped under long-term contracts with West Africa and the British Pacific Islands. Such supplies will be sold to the trade in competition with those available from other sources.

No decision has yet been taken about the importation of lard on private account after May 31, 1954, but lard from the United States purchased with dollars allotted under Section 550 of the Mutual Security Act of 1953 will be available shortly after the date of decontrol.

Condensed and Dried Milk

Manufacturers are now free to make any type of condensed milk or milk powder and are no longer required to sell their products to the Ministry of Food, following the removal of controls on condensed and dried milk on April 1.

The Condensed Milk Pool, which for the past 12 years has acted as distributive agent for the Ministry, ended its operations on March 31. The marketing of the Ministry's stocks of condensed milk will be organised through manufacturers and others concerned. The Milk Powder Pool will continue to operate for the purpose of disposing of stocks of milk powder owned by the Ministry. Wholesalers and retailers will be free to purchase supplies from the manufacturers or other suppliers of their choice.

Sugar for Export Goods

In continuation of the special arrangements which have been in force since sugar was derationed, the Ministry of Food has announced particulars of a scheme to enable manufacturers of goods containing sugar intended only for export to continue to buy supplies of sugar or sugar products for this purpose on the basis of the world price for sugar. The scheme will be known as "Sugex," and will replace the Special Export Price Scheme (S.E.P.).

Manufacturers and dealers wishing to take part in the new scheme should apply to the Ministry of Food for recognition as authorised manufacturers or dealers.

Authorised manufacturers will be able to obtain "world price" supplies of sugar of U.K. origin either from sugar refiners or from authorised dealers. Authorised manufacturers and dealers may also apply for licences to import sugar or sugar products (*e.g.* syrup, invert sugar, caramel) on their own account under the scheme.

Authorised manufacturers and dealers will be required to render returns to the Ministry showing details of their trade in "world price" sugar or sugar products.

Details of the scheme may be obtained either from the appropriate food manufacturing associations or direct from the Ministry of Food, Sugar Division, Great Westminster House, S.W.1, to whom applications for recognition as authorised manufacturers or authorised dealers must be addressed. Forms of application for an import licence may be obtained from the Board of Trade, Import Licensing Branch, 43, Marsham Street, London, S.W.1 or from any Regional Office of that Department, but the completed form should be sent in the first instance to the Ministry of Food.

New Zealand Meat Agreement

The New Zealand Government have announced that they propose to accept the offer, made by the United Kingdom Government when they decided to decontrol meat this summer, to end the seven year meat agreement on September 30, 1954, instead of September 30, 1955. The Ministry of Food will remain the sole purchaser of meat produced in New Zealand for export to the United Kingdom until September 30, 1954, and meat will therefore be arriving on Ministry account for some months after that date. The Ministry have assured the New Zealand Government that representatives of the New Zealand Meat Producers Board will be fully consulted on the disposal of these shipments and any other stocks of New Zealand meat in the possession of the Ministry of Food.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Wafer Biscuits for Ice Cream

B.6939. *We should be obliged if you would provide us with a formula for wafer biscuits as used in the ice cream industry.* (Italy)

Good wafers should be crisp to eat and tough enough to stand up to the various cutting and packing procedures in the factory and to act as a carrier for the ice cream. The production of wafers having the correct balance of crispness, fragility, and strength is one of the problems with which manufacturers have to contend.

One formula used in wafer biscuit making is as follows:

	lb.
Flour	100
Fat	5
Soda bicarbonate	1
15-16 gal. water according to requirements.	

The fat is rubbed into the flour, 11 gal. of water are added, and made up quickly to a paste. The remainder of the water is then added and the whole whisked to a batter. A standard measure of batter is poured on to the wafer plates and cooked from one to one and three-quarter minutes. The consistency of the batter affected by the proportion of water to flour is the factor of greatest importance. The flour quality is also important in this connexion because strong flours enable more water to be used to give the same batter consistency as a weak flour.

Candied Pears and Greengages

B.7011. *Could you please give us details of the method of preparing candied pears and greengages?* (Kent)

The method of candying pears is as follows:

Small, firm pears only are used; these may be preserved or fresh. In the latter event, the pears are cored and peeled, then placed immediately in brine solution to prevent discoloration. The fruits are boiled in water to expel the brine and to tenderise the fibres and pierced with stainless steel wires to allow later penetration of the syrup. Since syrup-impregnated pears would look extremely insipid without some coloration, the fruit is usually dipped in a fairly strong colour solution, either green or red, before syruping. The softened and coloured fruits are cooled in running water and placed on wire trays which are transferred to the vats and covered with a hot sugar syrup at 18° Baumé in which they remain for 48 hours. The subsequent syruping and glazing procedures are identical with those described for greengages, which are prepared as follows:

After freeing from brine and sulphurous acid, the greengages are boiled in an 18° Baumé sugar syrup until tenderised. When this point, ascertained by testing several pieces, is reached, the fruit is allowed to stand in the syrup for 48 hours. It is an advantage to lay the fruit on shallow wire trays in the syrup vats to allow free access of the syrup to each piece. The syrup is withdrawn and treated in the vacuum unit to increasing densities, 20°, 27°, 32°, 37°, and 40° Baumé by the addition of appropriate quantities of sugar and also adding to the 27° Baumé syrup 25 per cent. by weight of corn syrup. Each charge of syrup is returned to the fruit and allowed to stand for 24 hour periods with the exception of the final syrup in which the fruit remains for four days. Finally, the fruit is drained, dipped momentarily in hot water to remove the surplus syrup, and placed on wire trays in hot rooms at 150°F. to dry.

The fruit is glazed by the following method:

Sugar and water are placed in a small steam pan in the proportion of 2:1 respectively, and in predetermined quantities to accomplish the glazing process without an unnecessary surplus of syrup. The sugar is thoroughly dissolved, and the solution boiled to 235°F. Heating is discontinued, and the well-dried impregnated fruit is placed in the supersaturated sugar solution, followed by the setting up of a local granulation in the syrup by rubbing the side of the pan with a spatula. The fruit pieces are rapidly forked out, each passing through the granulated portion, placed on wire trays, and allowed to stand for 24 hours in a dry, warm room. The fruit will then have acquired a crisp, dry, sugar glaze and be ready for packing.

Information Supplied

The Information Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.6936. *Apple peeling and coring equipment.* (Lincs.)
B.6937. *Sugar manufacture.* (South Africa)
B.6941. *Cream cracker biscuits.* (Siam)
B.6942. *Chocolate enrobing equipment.* (Warwicks.)
B.6944. *Sauces, salad cream, and chocolate crumb.* (Ireland)
B.6945. *Milk shake mixers.* (London)
B.6947. *Soup manufacture.* (Ches.)
B.6948. *Wrapping equipment for jars.* (Ireland)
B.6949. *Jam manufacture.* (Ireland)
B.6950. *Sugar confectionery.* (Scotland)
B.6951. *Salad cream standards.* (Ireland)
B.6954. *Dust removal.* (Lancs.)
B.6955. *Gelatine capsules.* (London)
B.6956. *Wafer biscuits.* (Malta)
B.6957. *Clips for casings.* (Ireland)
B.6958. *Lard packing and filling equipment.* (Scotland)
B.6959. *Shortening for baked goods.* (Leics.)
B.6963. *Farina.* (Yorks.)
B.6965. *Beans for canning.* (Herts.)
B.6968. *Egg albumen substitute.* (Staffs.)
B.6969. *Jam manufacture.* (America)
B.6970. *Chocolate vermicelli.* (Berks.)
B.6971. *Horseradish shredding equipment.* (Lincs.)
B.6973. *Butylated hydroxyanisole.* (Bucks.)
B.6974. *Fruit juice concentrates.* (Warwicks.)
B.6975. *Lemon curd.* (Scotland)
B.6976. *Cocktail cherries.* (Italy)
B.6978. *Moisture testing equipment.* (Lincs.)
B.6979. *Spinach washing equipment.* (Norway)
B.6982. *Pig's fry.* (N. Ireland)
B.6984. *Can opener.* (Yorks.)
B.6985. *Sherbet powder.* (London)
B.6986. *Margarine manufacture.* (London)
B.6988. *Ham cooking.* (N. Ireland)
B.6989. *American cake flours.* (Uruguay)
B.6990. *Mincemeat.* (Leics.)
B.6992. *Bottle filling and labelling equipment.* (Denbigh.)
B.6994. *Carnauba wax.* (Bucks.)
B.6995. *Metal detectors.* (Scotland)
B.6996. *Crimping equipment.* (London)
B.6998. *Brominated vegetable oil.* (Norway)

Recent Patents

705,633. De Laval Separator Co.: Separation of solids from liquids.
705,657. Imperial Chemical Industries, Ltd.: Cleansing beer handling equipment.
705,726. Steinmann, W.: Continuous melting of fat from animal material.
706,437. Avery, F. J.: Apparatus for treating meat.
706,506. Atlas Powder Co.: Chocolate compositions and process for the stabilisation of same to prevent bloom.
706,523. Lamb, H. T.: Food mixing machines.
706,540. Rival Manufacturing Co.: Meat mincer and vegetable cutter.
706,607. Roche Products, Ltd.: Process for the manufacture of dispersable solutions of fat-soluble vitamins.
706,673. Friedrichsdorfer Zwieback- und Nahrmittelfabrik Milupa-Pauly Ges.: Process for preparing oatmeal gruel.
706,683. MacIlwaine, G. W.: Apparatus for extracting oil from vegetable matter such as seeds.
706,691. Spooner Food Machinery Engineering Co., Ltd.: Baking of food products in an oven.
706,705. Quaker Oats Co.: Method and apparatus for the electrostatic separation of corn from its impurities.
706,761. Oddy's (Engineers), Ltd., and Oddy, F. W.: Dough dividing machines.
706,775. Mirrlees Watson Co., Ltd., and Martindale, C.: Sugar cubing machine.
706,845. Weaver, N. G.: Mechanical shaping and oiling of dough pieces for baking bread.
706,942. Rank, Ltd., J., and Hay, J. G.: Method of making bread with untreated and unbleached flour.
707,453. Liston, S.: Method of producing wrapped bread and similar bakery products.
707,454. Metallges. Akt.-Ges.: Process of purifying oils or fats.
707,476. Barnhard, H. J.: Device for use in packing articles of food into a container.
707,533. Dairy Accessories Co., Ltd., and Martin, E. A.: Milk coolers or other heat-exchange apparatus.
707,535. Precision Thermometer and Instrument Co.: Liquid density measuring equipment.
707,639. Powling, W. T., Powling, W. T. L., and Davis, P. S.: Apparatus for use in the preparation of animal foodstuffs.
707,763. Miag Vertriebsges.: Method and apparatus for separating impurities from grain, such as cereals, seeds, and the like.
707,827. Felber, N.: Method and apparatus for electric baking of food.
708,084. Rose Bros. (Gainsborough), Ltd.: Sweet forming and wrapping machines.
708,129. Lyons and Co., Ltd., J., Hughes, E. B., Ramsden, J. F., and Stuart, M. D.: Manufacture of tea.
708,154. Sandermann, W.: Production of vitamin E concentrates.
708,373 Standard Brands, Inc.: Process for preparing cacao beans.

British patents and trade marks have been selected from the "Official Journal of Patents" and the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

ABSTRACTS OF BRITISH PATENTS

Pneumatic Grain Handler

This invention is concerned with an apparatus for transporting or conveying grain or other granular materials from a hopper or other storage or collection point to a sack filling position or selected storage bins or the like. The apparatus conveys the grain or other material by means of air currents and it is mobile for easy removal from place to place.

699,823. *Geo. W. King Ltd.*

Pastry Moulding

A pastry moulding machine of the intermittently rotatable type is described, the use of which provides a simple and economic arrangement for obtaining different thicknesses of pastry mouldings.

700,749. *Concentric Manufacturing Co., Ltd.*

Cream Substitute

A process is described for the manufacture of a dry powder which, by mixing with cold water, can be transformed into a product having the properties and appearance of rich cream. It comprises the homogenisation and spray drying of an aqueous mixture of skimmed milk and edible fat to which has been added monoglyceride or diglyceride of edible fatty acid, lecithin, and methyl ethyl cellulose or carboxymethyl cellulose.

701,697. *L. E. Pritchitt and Co., Ltd.*

Vibrating Conveyors

An improved type of vibratory conveyor is described in which the advantages of rotating and non-rotating vibrators are combined.

This consists of a base or reaction mass, the weight of which may be altered during operation to achieve the desired effect, *e.g.* by having a part or all of it hollow to receive shot, sand, or similar weighting material. The mass is mounted on the ground or on fixed points by means of dampers or shock absorbers, and on it, by means of flexible plates or strips, is mounted the conveyor trough. Attached to the trough is an out-of-balance rotary mass driven by an electric motor, or other means, to impart vibrations to the trough. Various alternatives are described, and conveyors incorporating this invention are claimed to possess numerous advantages over those employing electromagnetic vibrators.

698,604. *Emile Damond.*

Depositing Marshmallow and Dough

An improved form of depositor is described for depositing dough, batters, and the like to produce vanilla wafers, pound cake, layer cake, sponge cake, and so forth and for depositing marshmallow, jams, jellies, and the like on biscuits or cakes which are supported by a continuously moving conveyor during the depositing operation.

The depositor comprises a depositing head for depositing flowable material on articles carried by a continuously movable conveyor; valve means adapted to permit or prevent deposit of material through from the head; means supporting the head for movement lengthwise of the conveyor; and a mechanism operable in timed relation to the movement of the conveyor to move the head lengthwise of and in the direction of movement of the conveyor, open the valve means during such movement, then close the valve means and move the head in the direction opposite to the direction of movement of the conveyor.

Due to the light weight manifold member and its relatively small capacity as contrasted with the prior hopper mechanisms, it is possible to move the manifold member at a much higher speed and thereby increase the rate of production of the machine compared with that of the prior continuous or intermittent depositors.

Another advantage is that it affords a completely closed system for the material being deposited, thereby reducing contamination to a minimum.

700,962. *Earle Thomas Oakes.*

Nut-husking Machines

This invention concerns improvements relating to nut-husking machines and is particularly concerned with machines for husking nuts such as cashew nuts. Cashew nuts present particular difficulties on account of their shape and structure. They are of irregular shape and size, but are in general of so-called kidney shape, having a concavity on one side and being convex on the other. The nuts are longer than they are wide and somewhat flattened on the flanks. The kernel is enclosed by a fine pellicle similar to that of a groundnut. Outside this, there is a dark brown husk which consists of outer and inner hard shells separated by a cellular layer.

Specific objects are to provide an improved arrangement for cutting the husks of the nuts, to provide means for ensuring that the kernel of the nut is not retained within one of the half-husks into which the husk has been cut, and to provide an effective mechanical feeding arrangement whereby nuts, especially those of the peculiar shape of raw cashew nuts, can be properly fed one by one to the main part of the machine in synchronisation with the operation of the latter.

703,848. *P. Santos Gill and Cia Limitada.*

ABSTRACTS OF FOREIGN PATENTS

Coated Food Container

The process of preventing the adhesion during cooking of proteinaceous meaty materials to the interior surfaces of a metal container consists of the application of a coating consisting essentially of a polyhydroxy alcohol partial ester of a non-hydroxy saturated fatty acid having at least 12 carbon atoms.

U.S. Patent 2,655,451. *Wilson and Co., Inc., and Edgar, A. C.*

Pectin Production

In the production of colourless pectin and/or colourless pectin extracts, the thin liquors from the manufacture, previously freed from albumen, of more or less thoroughly condensed pectin or pectin extracts are subjected to contact adsorption with mixed synthetic resins having basic and acid constituents.

German Patent 863,167. *Pomosin-Werke G.m.b.H.*

Trade Marks

SUN D'OR.—704,461. Lemonade powder. **Alfred Howard Scrase, Maurice Robert Scrase, George Percival Clarke,** and **Winifred May Geering,** trading as **Young, Randall and Company,** Sundor Works, Manor Royal, Crawley, Sussex; Manufacturers.

SAXOAT.—706,838. Preparations of oats for use as food for human consumption. **Blakey's Food Company, Limited,** Hungate, Lincoln; Manufacturers.

TURN-OVER.—709,366. Apparatus for filtering, sterilising, softening, and purifying water. **"Turn-Over" Filter Company, Limited,** Prince Regent Road, Castlereagh, Belfast, Northern Ireland; Manufacturers and Merchants.

NORFOLK.—710,336. Stuffing made principally from cereal products and containing sage and onions or thyme and parsley, for sale in England and Wales. **Peter Rowland Hill,** trading as **The Oakham Packing Company,** Main Street, Wymondham, Melton Mowbray, Leicestershire; Manufacturer.

WILKINSON'S.—714,960. Mint flavoured sweetmeats, liquorice sweetmeats, sugar sweetmeats, almond confectionery, coconut confectionery, and fruit pastilles, all being non-medicated. **W. R. Wilkinson and Company, Limited,** Ferrybridge Road, Monkhill, Pontefract, York; Manufacturers.

EMAILLIT.—718,401. Containers for use in the brewing, distilling, and allied industries and parts of such containers. **Munk und Schmitz Kommanditgesellschaft** (a Kommanditgesellschaft organised under the laws of Germany) (personally responsible partner **Rudolf Baldus**), 92-104, Poller Kirchweg, Köln-Poll, Germany; Manufacturers and Merchants.

RIPPLE.—719,242. Ice cream. **Gerald George Balch,** trading as **Balch Flavor Company,** 1301, Adams Street, Pittsburgh 33, Pennsylvania, United States of America; Manufacturer and Merchant.

CHIX.—719,322. Food preparations made from chicken. **Harry Peck and Company, Limited,** 8, Devonshire Grove, London, S.E.15; Manufacturers.

SUNFIT.—719,661. Edible oils and edible fats. **Western Margarine, Limited,** Westfields Road, Acton, London, W.3; Manufacturers.

TETRATOX.—719,728. Fungicides. **Pest Control, Limited,** Bourn, Cambridgeshire; Manufacturers and Merchants.

FILTRAGOL.—720,134. Preparations for clarifying fruit juices. **Farbenfabriken Bayer Aktiengesellschaft** (a Joint Stock Company organised under the laws of Germany), Bayerwerk, Leverkusen (22c), Germany; Manufacturers and Merchants.

CARRICK.—720,374. Salt for food and for household purposes, all being goods for sale in Northern Ireland. **Imperial Chemical Industries, Limited,** Imperial Chemical House, Millbank, London, S.W.1; Manufacturers and Merchants.

PHYCOL.—720,518. Alginates being chemical products for use in industry. **Alginate Industries, Limited,** Walter House, Bedford Street, Strand, London, W.C.2; Manufacturers.

ZAG-NUT.—720,531. Non-medicated candy containing nuts. **The D. L. Clark Company** (a Corporation organised and existing under the laws of Pennsylvania, United States of America), 503, Martindale Street, Pittsburgh 12, State of Pennsylvania, United States of America; Manufacturers.

PIONEER.—720,937. Chemical products for use in industry, but not including sweetening materials or preparations for preserving foodstuffs. **Fredk. Boehm, Limited,** 19, Bentinck Street, London, W.1; Manufacturers.

CHOLLY CHOC.—723,356. Chocolate-flavoured milk beverages. **Panda Table Waters, Limited,** 3, Dyer's Buildings, Holborn, London, E.C.1; Manufacturers and Merchants.

TUDOR.—723,359. Sauces. **Manor Vinegar Brewery Company, Limited,** Gower Street, Lozells, Birmingham, 18; Manufacturers.

PIECES OF EIGHT.—723,389. Non-medicated confectionery. **Rowntree and Company, Limited,** The Cocoa Works, Wigginton Road, York; Manufacturers and Merchants.

AUNT SARAH'S.—723,447. Biscuits for human consumption. **Excelsior Biscuit Company, Limited,** 11 Old Jewry, London, E.C.2; Manufacturers and Merchants.

EDINA.—723,466. Vinegar and sauces. **William Pender, Limited,** East Silvermills Lane, East Silvermills, Edinburgh, 3; Manufacturers.

TABLE TALK.—723,578. Cheese. **Towers Creameries, Limited,** Towers Factory, Commonside East, Mitcham, Surrey; Manufacturers and Merchants.

ALBFOAMO.—723,676. Substances for use as ingredients in the manufacture of sugar confectionery. **The Scottish Flavour and Colour Company, Limited,** Mayfield Works, 27-29, Ratcliffe Terrace, Edinburgh; Manufacturers and Merchants.

SURETEX.—723,904. Edible fats. **A. A. Mont, Limited,** trading also as **Alpha Margarine Company,** Brixham Road, Ayres Road, Old Trafford, Manchester, 16; Manufacturers.

QUICKIES.—724,019. Cake mixtures. **L. E. Pritchitt and Company, Limited.,** 262, Uxbridge Road, Hatch End, Middlesex; Manufacturers.

COMPAXO.—724,026. Canned meats. **Cornelis Nicolaas van der Post** trading as **"Compaxo" Vleeswaren en Conservenfabriek,** Schielands Hoge Zeedijk 41, Gouda, Holland; Manufacturer.

New Companies

Barling's Five Sales, Limited. (528317.) To carry on business of manufacturers of and dealers in foods of all kinds, aerated and mineral waters. Nom. cap.: £100 in £1 shares. Dirs.: to be appointed by subs. Subs.: W. C. Barling and Mrs. C. B. Hooper, 29, Macaulay Road, London, S.W.4.

F. G. Dransfield and Company, Limited. (528336.) 290, Manchester Street, Oldham. To carry on business of manufacturers of and dealers in sweets, chocolates, confectionery, flour, biscuits, and farinaceous compounds; and tobacconists. Nom. cap.: £15,000 in £1 shares. Dirs.: F. Hilton and Mrs. E. I. Hilton, 28, Brookfield Street, Leigh, and Miss M. Harris, 121, Light Oaks Road, Pendleton, Salford.

Colwill (Purley), Limited. (528530.) 62, Oxford Street, London, W.1. To carry on business of manufacturers of and dealers in chocolates, sweets, and confectioneries. Nom. cap.: £1,000 in £1 shares. Dirs.: L. J. Colwill and Barbara Colwill, 941, Brighton Road, Purley, Surrey.

Sugar Grinders (Radcliffe), Limited. (528556.) 33-35, Church Street, Radcliffe, Lancs. To carry on business of manufacturers of and dealers in sugar, treacle, and syrups. Nom. cap.: £1,000 in £1 shares. Dirs.: J. M. Berish and Ninette S. Berish, Standhurst, Ringley Road, Whitefield, Lancs.

Richmond Confectionery Company, Limited. (528654.) 36, Denton Road, Audenshaw. To take over business of a manufacturer of and dealer in sweets carried on at Audenshaw by Francis J. McCarthy. Nom. cap.: £8,000 in £1 shares. Dirs.: F. J. McCarthy (mang. dir.), Mrs. W. B. McCarthy, and R. P. McCarthy (all permt.), of 18, Stanhope Avenue, Audenshaw.

Rawling and Company, Limited. (528708.) 9, Alma Square, Scarborough. To carry on business of manufacturers of and dealers in confectionery, chocolates, sweets, and ices. Nom. cap.: £5,000 in £1 shares. Dirs.: J. S. Rawling, 51, Alexandra Park, Scarborough, and E. Tweddill, 30, Stepney Grove, Scarborough.

Hall's Crisps, Limited. (528839.) 99, Sherwood Street, Warsop, Notts. To take over business of potato crisp manufacturer carried on at Warsop, Notts, by Eric Hall and Edna M. Hall. Nom. cap.: £4,000 in £1 shares. Dirs.: E. Hall and Edna M. Hall, Manor Farm, South Collingham, Nr. Newark, and A. S. T. Hall, 137, Southwell Road East, Rainworth, Nr. Mansfield.

J. G. Booth-Smith and Company, Limited. (528841.) Plantation House, Mincing Lane, London, E.C.3. To carry on business of manufacturers of and dealers in tea, coffee, cocoa, and other food beverages and preparations. Nom. cap.: £25,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: J. L. Burles and K. P. Gibson (clks.), 6, Austin Friars, London, E.C.2.

St. James (M. and P.), Limited. (528890.) St. James Works, Condercum Road, Newcastle-on-Tyne, 4. To carry on business of manufacturers of and dealers in pickles, sauces, mayonnaise, soups, and potted meats. Nom. cap.: £5,000 in £1 shares. Dirs.: E. R. Hudspith, Springfield, Crabtree Road, Stocksfield, Northumberland, and G. E. Bridge, 268, Ovington Grove, Newcastle-on-Tyne.

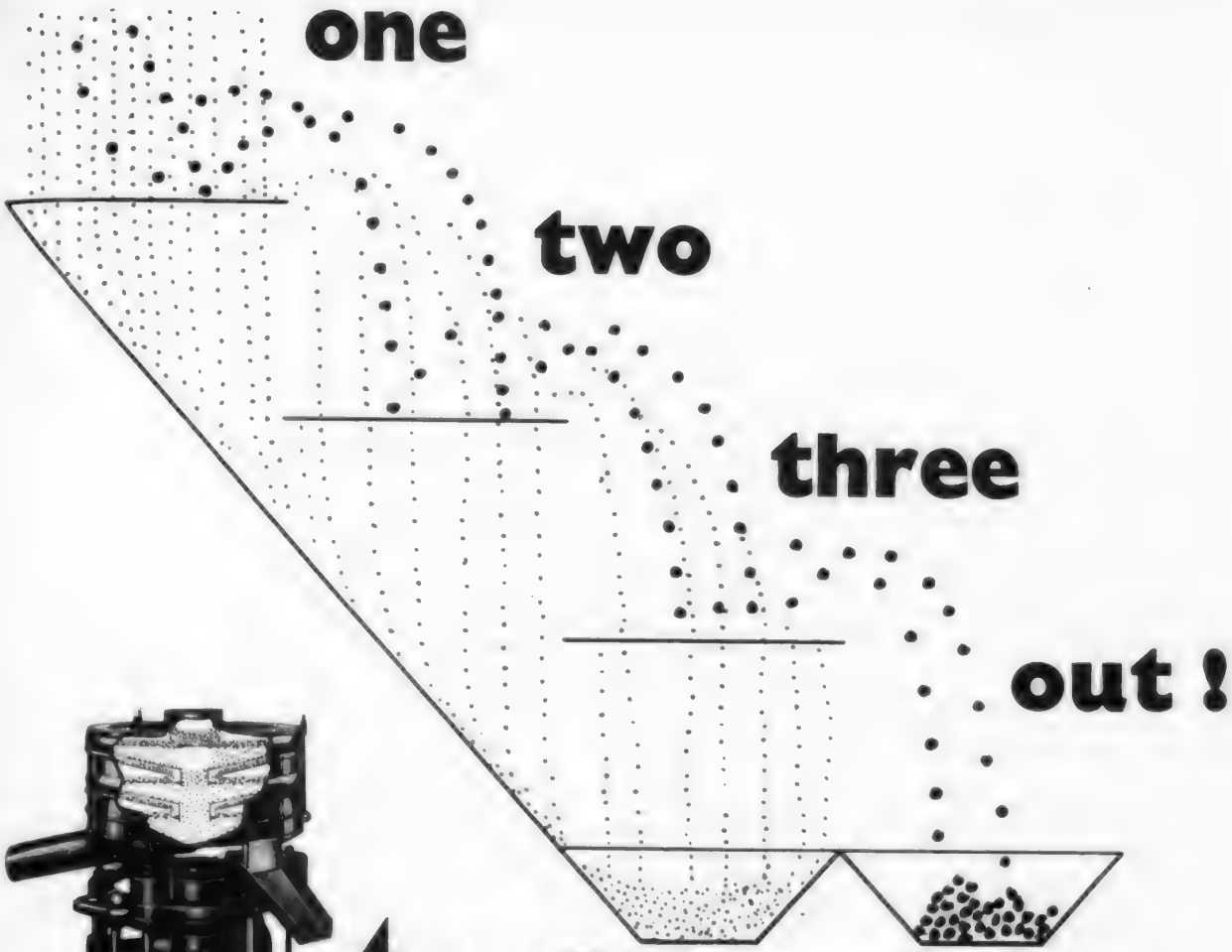
Cameron Gray Sweet Company, Limited. (529131.) 28, Osborn Street, London, E.1. To carry on business of manufacturers of and dealers in chocolate, boiled, and other sweets. Nom. cap.: £100 in £1 shares. Dirs.: A. Gray and Nancy C. Gray, 325, Beckton Road, London, E.16.

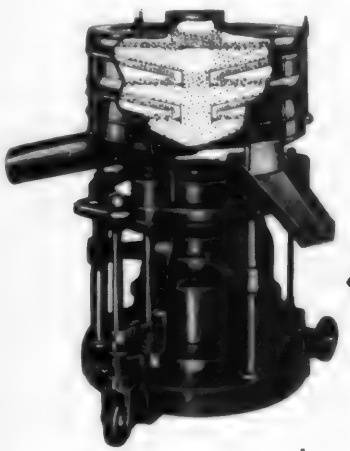
A. Reval and Company (Chemicals), Limited. (529172.) 7-8, Idol Lane, London, E.C.3. To carry on business of manufacturers of and dealers in chemicals, solvents, plastics, essential oils, waxes, hormones, and glandular products. Nom. cap.: £25,000 in £1 shares (15,000 non-cum. red. pref.). Dirs.: P. C. Gondos, 9, Ennismore Gardens Mews, London, S.W.7, and R. E. Spall, Eaton Vale, Weston Park, Thames Ditton, Surrey.

Reliance Confectionery Company, Limited. (529197.) Reliance Buildings, Waterloo Road, Blackpool. To take over business of manufacturers of sugar confectionery carried on at Blackpool as "Reliance Confectionery Company." Nom. cap.: £2,000 in £1 shares. Dirs.: R. Gradwell, 60, Newton Drive, Blackpool, and Mrs. S. Davis, 2, Roseacre, Blackpool.

Morris Food Manufacturers, Limited. (530120.) 129, Chatsworth Road, London, E.5. Nom. cap.: £100 in £1 shares. Dirs.: M. Morris and Mrs. M. Morris, 189, Evering Road, London, E.5.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.





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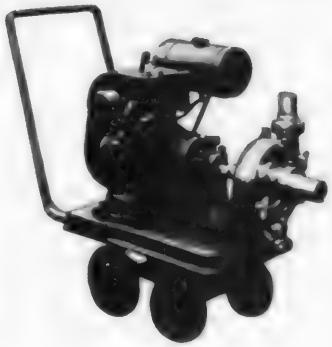

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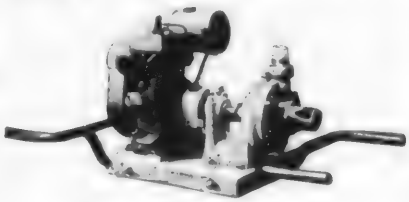

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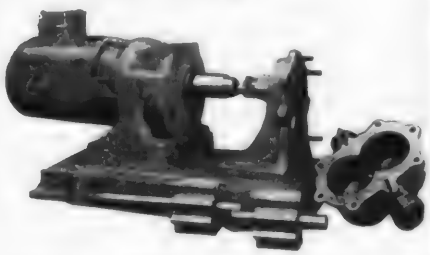

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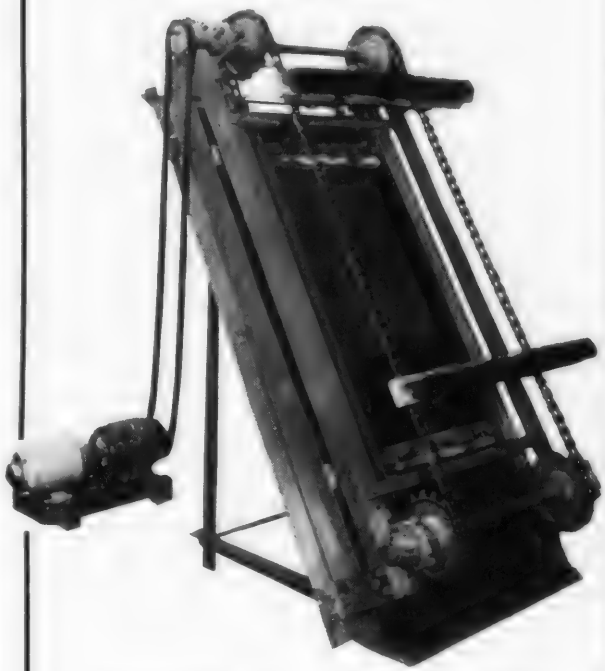

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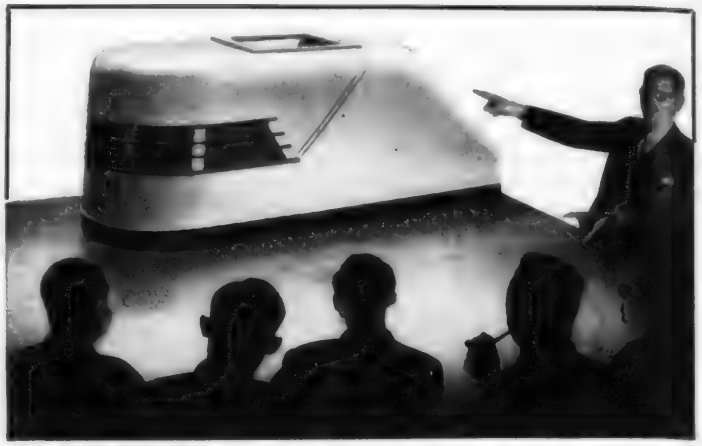

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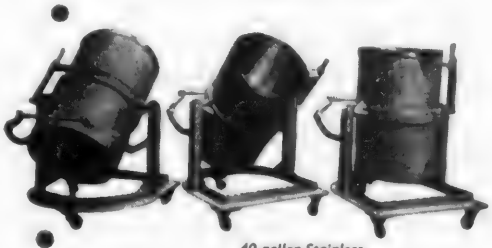

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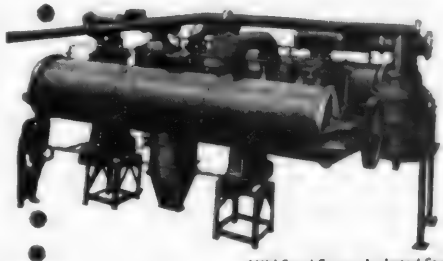

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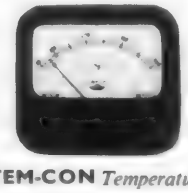

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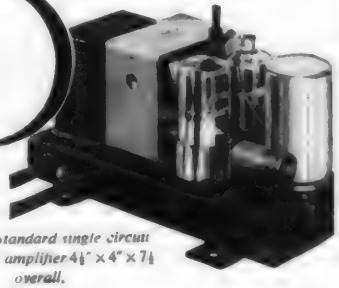

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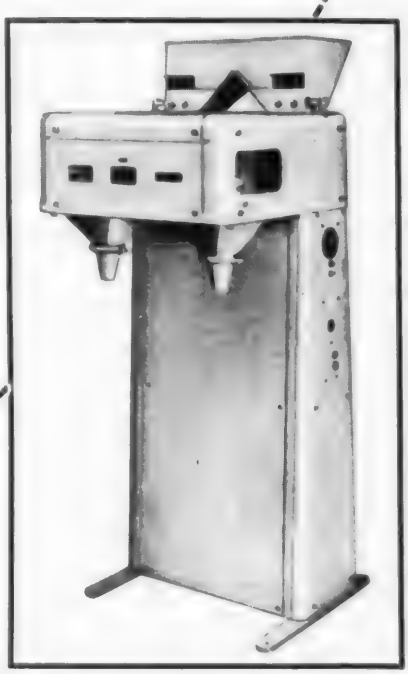

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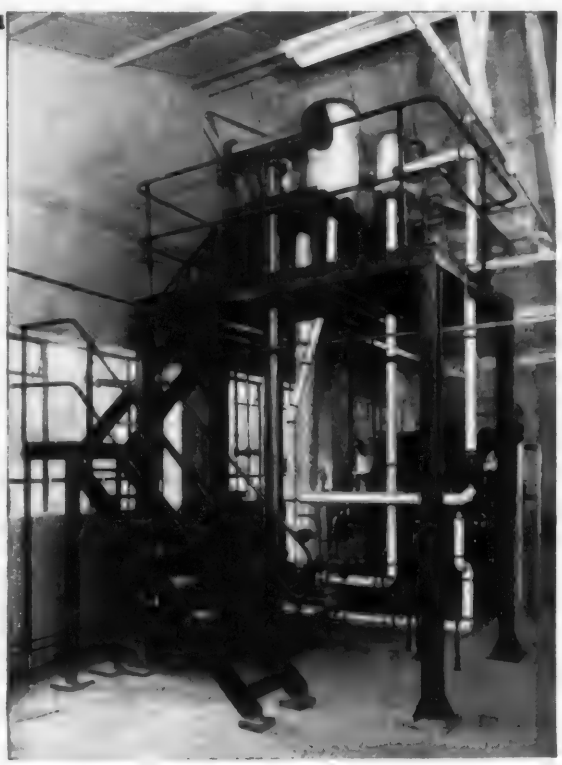

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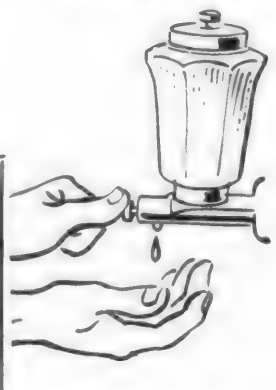

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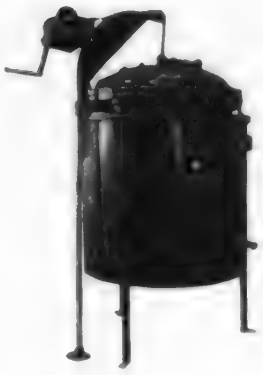

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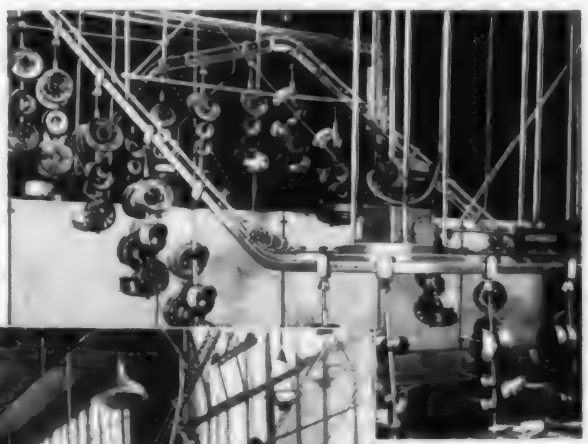

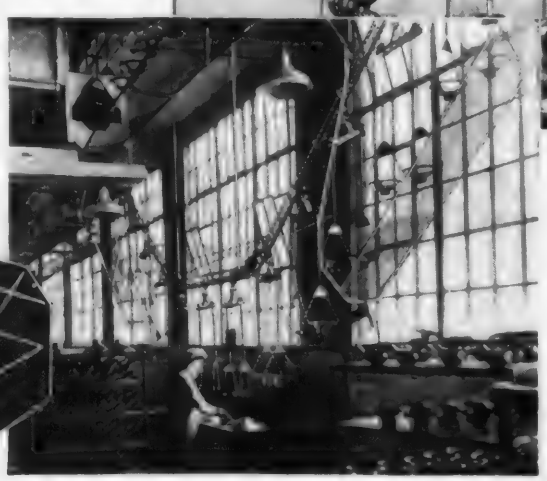

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Left: Teleflex conveyors are important links in the production lines at the works of the Plessey Co. Ltd., Ilford.

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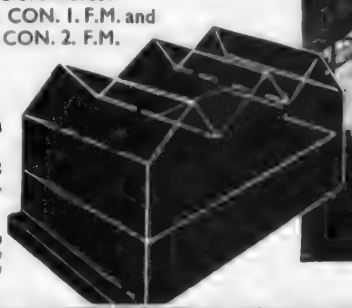

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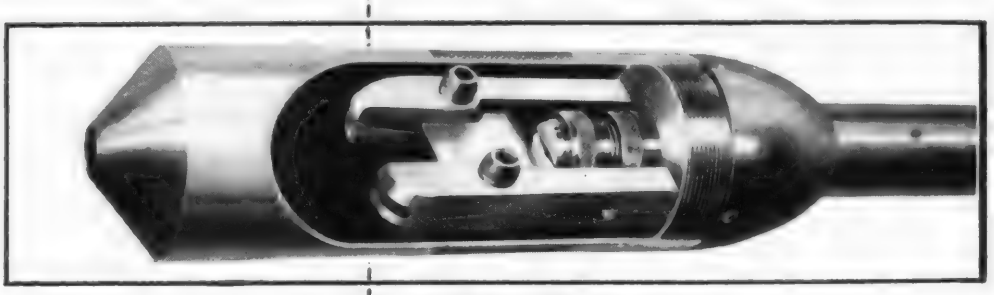

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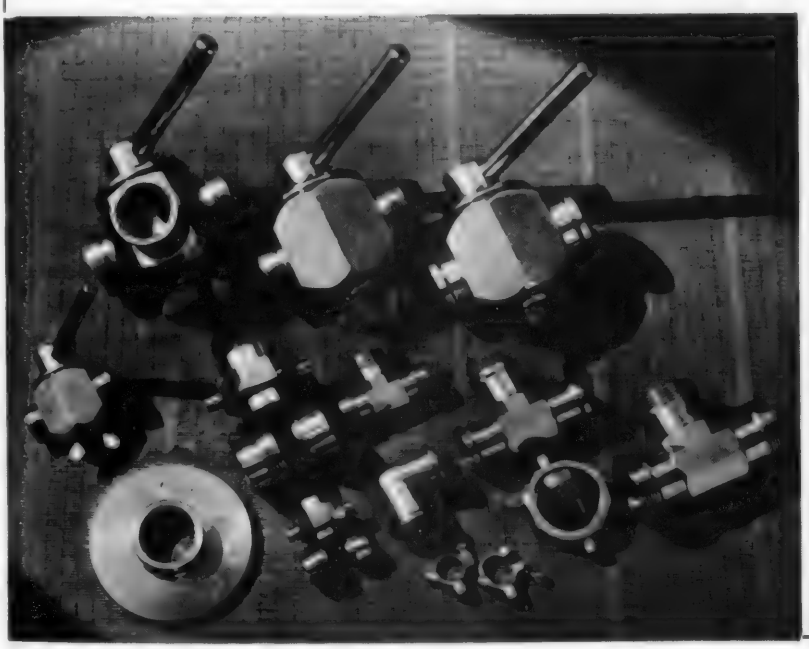

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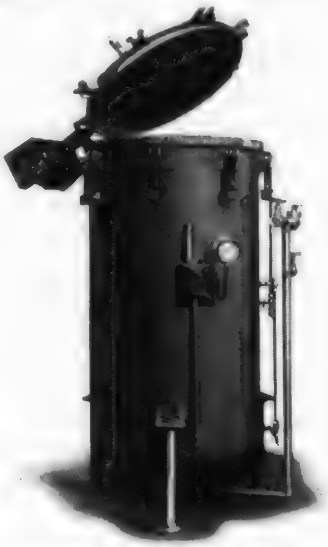

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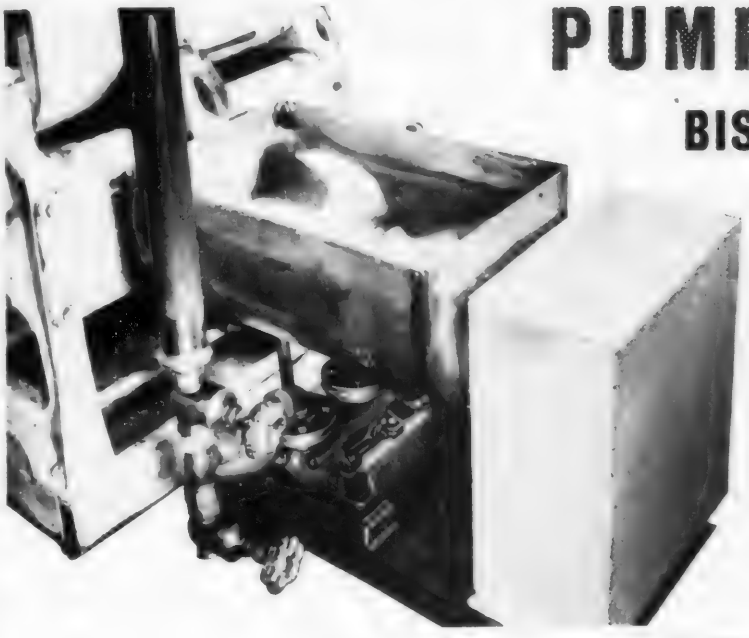

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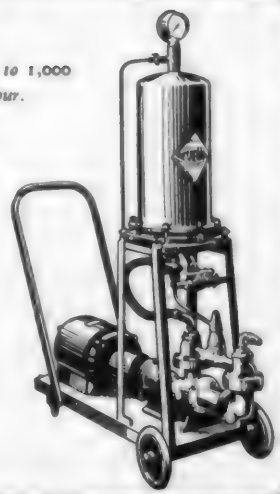

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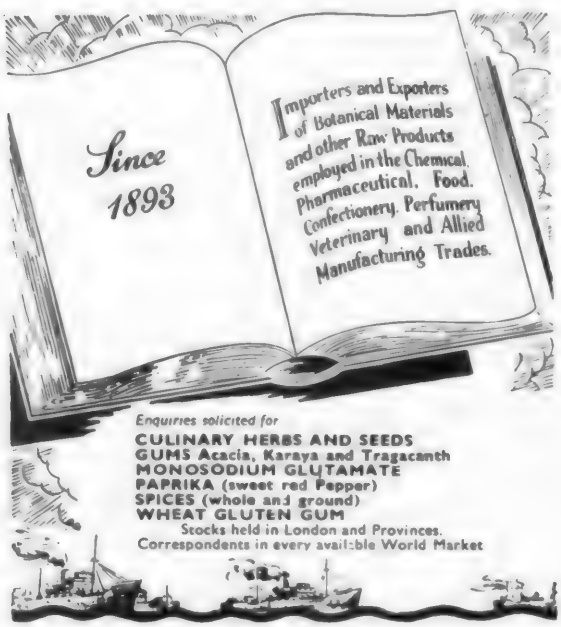
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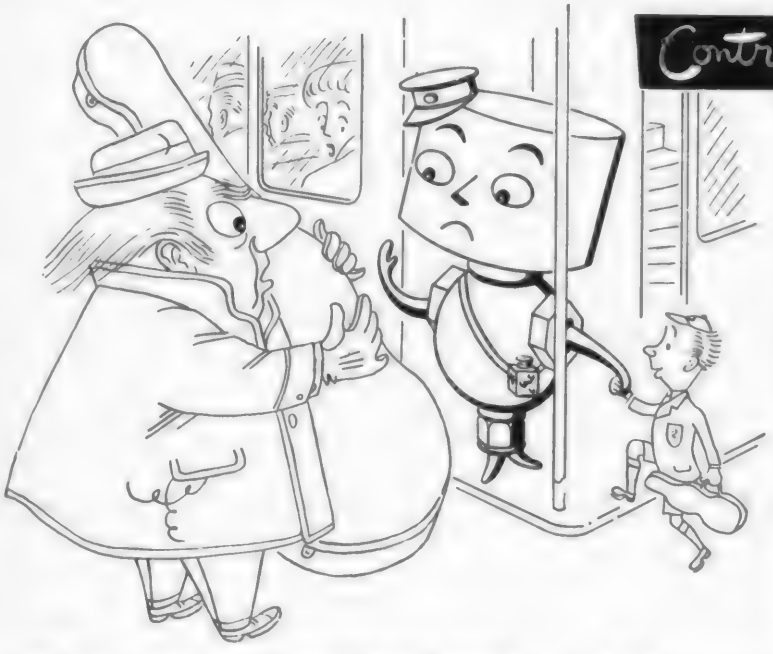

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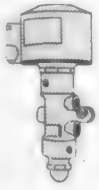

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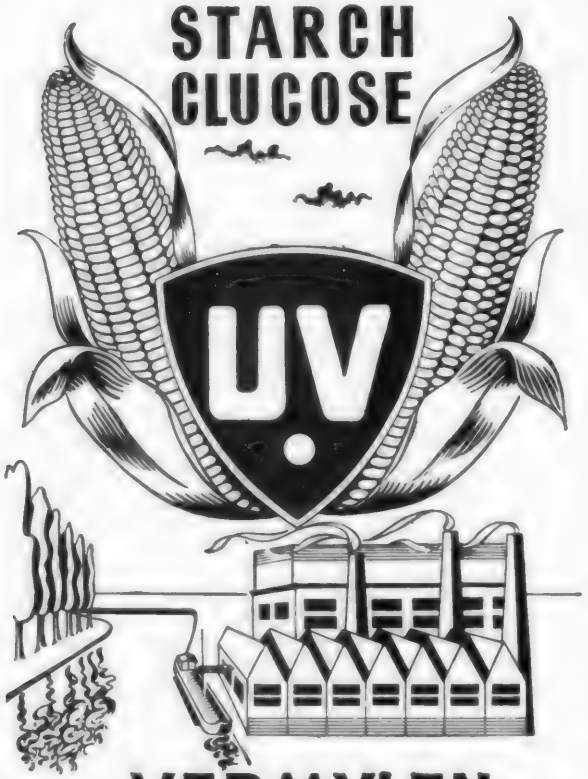

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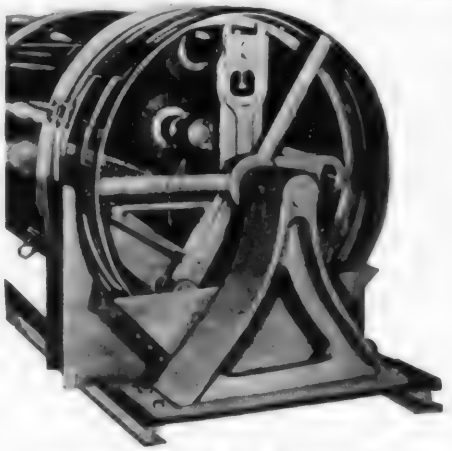

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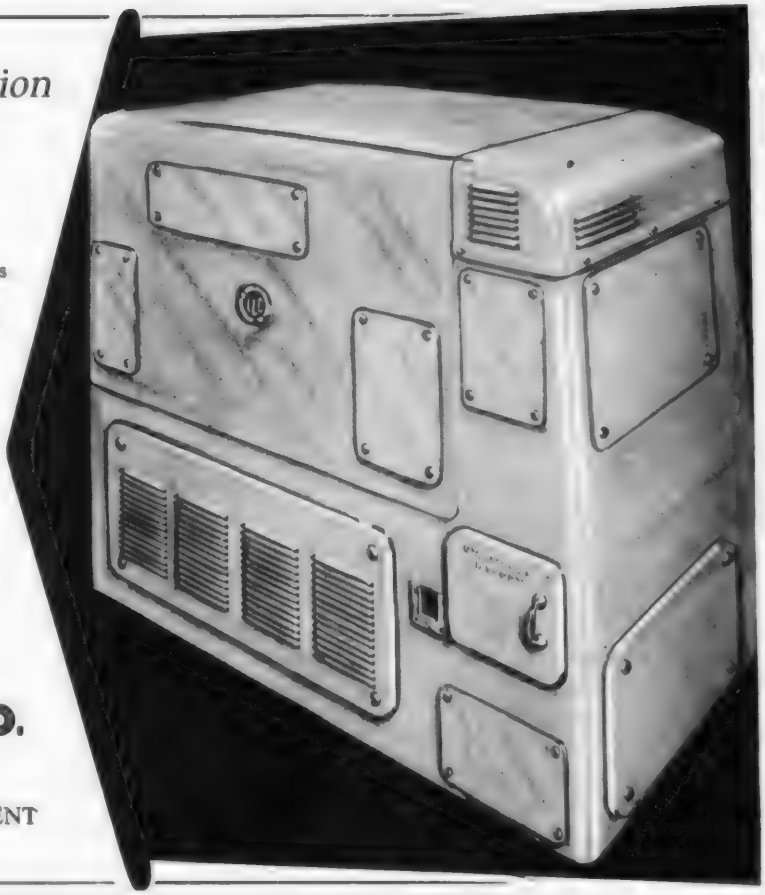

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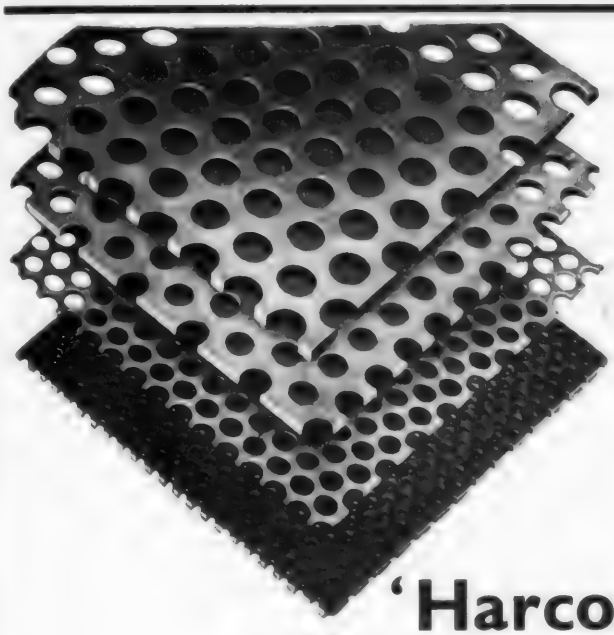

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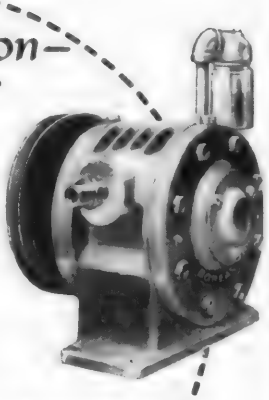

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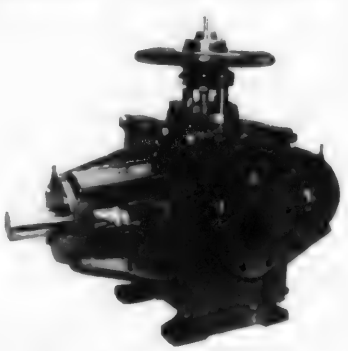

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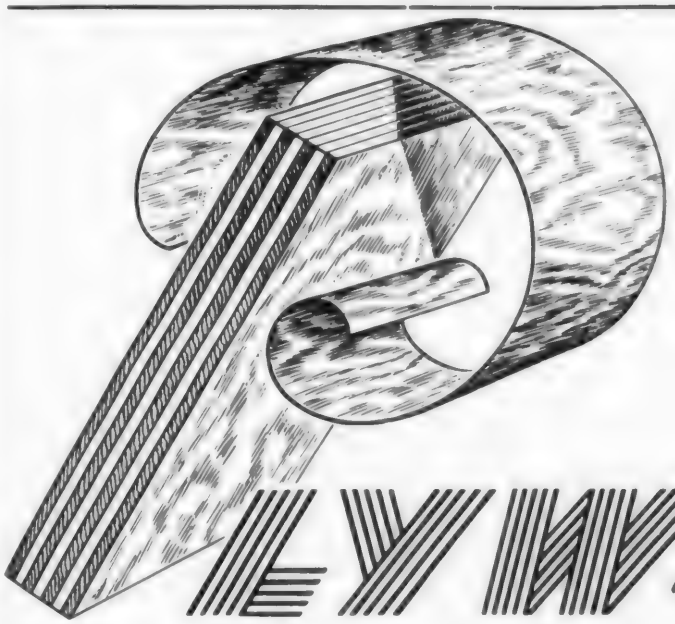

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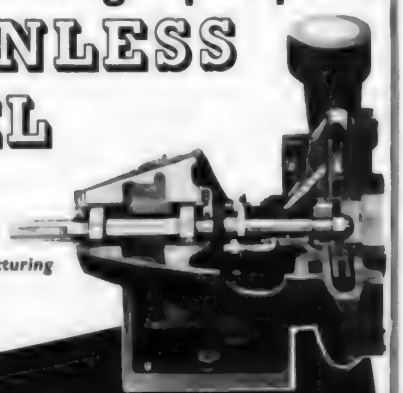

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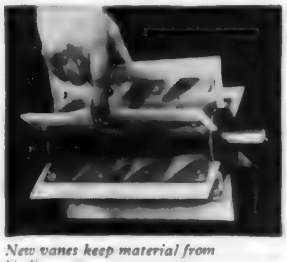

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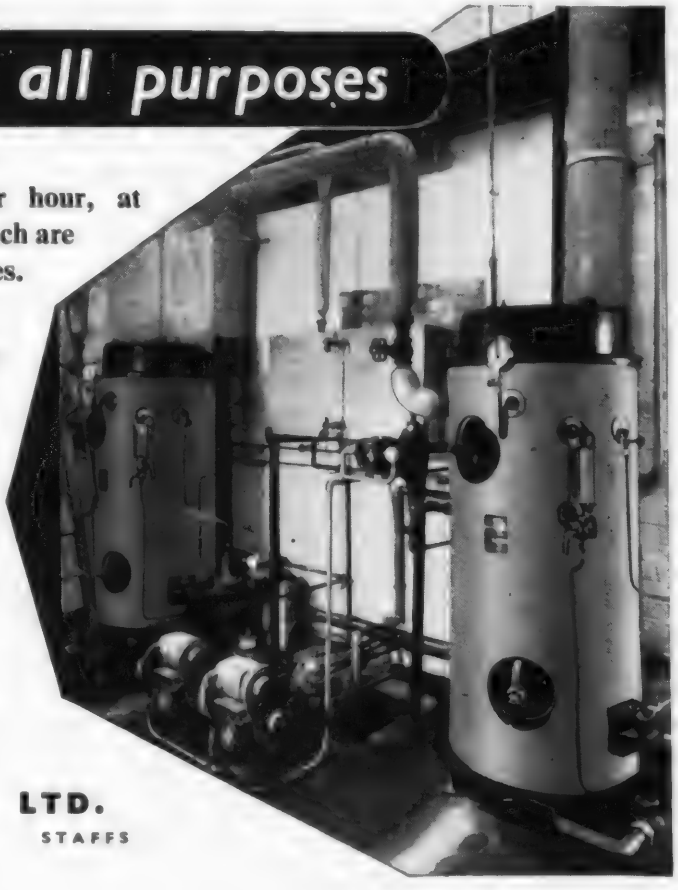

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SITUATIONS VACANT

LABORATORY Assistants (Male or Female) required for Laboratory of Ice Cream Factory, South-east London. Control work involving factory checking and part analysis. Intermediate Standard or above, with some experience of analytical or bacteriological work essential.—Write in full confidence stating details of past career and salary required to Box 934, c/o Dawson's, 129, Cannon Street, E.C.4.

AN old-established and expanding Company, in the London area, will shortly require a qualified Food Chemist for routine and control work in modern laboratories. The post is permanent and progressive. A pension scheme is in operation and canteen facilities are available. Salary according to experience and qualifications, but not less than £600—Address replies to the Chief Chemist, Box B4641.

ASSISTANT Chemist required for South London factory manufacturing jams, preserves and fruit juices. Interesting work, partly routine with some of investigational character. Previous experience not essential. —Full particulars apply Box B4640.

A DESIGNER with first-class experience on machinery used for sugar boiling and the manufacture of sugar confectionery is required by important manufacturers of machinery for the trade. The Company is well known and enjoys high reputation both as employers and for its products.—Applications should give full details of age, training, situations held and salaries earned in chronological order and should be addressed to Box B4638.

CEREBOS Limited require a Food Chemist for industrial research at their Factory near West Hartlepool; applicants should hold a degree in chemistry or A.R.I.C. and preferably have had some analytical experience in the food industry; some knowledge of microbiology would be an advantage.—Apply, giving full details of qualifications, experience and salary required to Chief Chemist, Cerebos Ltd., Greatham, West Hartlepool, Co. Durham.

CAPABLE Man required, thoroughly competent in the manufacturing of Bakers' Sundries able to organise production, re-deploy machinery, and handle operatives. State salary required, experience, etc.—Box B4631.

TECHNICAL Salesman required by Manufacturing Organisation of national repute, to expand and develop further the use of its products in manufactured foods. Good salary with prospects of advancement. Superannuation scheme.—Write stating age and experience to Box B4632.

PRODUCTION Foreman wanted for small meat canning plant, Manchester area. Experience with meat canning, staff control, decided advantage. Very good prospects. Starting salary from £600 p.a.—Apply Box B4634.

T. WALL and Sons Ltd., Food Products Manufacturers, require a Chemist to supervise their laboratory at Godley, Hyde (South Manchester) under the direction of the Factory Chief Chemist. Honours Degree or equivalent. A knowledge of bacteriology would be an advantage. Age 25-35. The work will involve considerable contact with Production Management and Staff. Salary according to age and experience.—Apply Staff Manager, The Friary, Acton, W.3.

SITUATIONS VACANT

EXPERIENCED Operator required for OKA Depositor.—Full details please in confidence to Box B4663.

CONFECTIONER experienced in the production of boiled sweets, toffees, jellies, chocolate and filled wafers, required by progressive Company in the London area. The work is mainly experimental in the Company's Research Department. Ideal working conditions, 5-day week, canteen. Salary will be commensurate with qualifications and experience.—Write Box FM556, c/o 191, Gresham House, E.C.2.

PRODUCTION Manager required by prominent North-west Firm of National Distributors. Applicants must have had experience in large production of hand and machine packing of carton dry goods. Aged 28/40. Permanent position for right type man with membership of pension fund. Salary from £750/1,000 per annum according to age and experience. Write giving fullest details of education, National Service, business career to date, age and total remuneration received during 1953. —Box B4643.

A FOOD Manufacturing Company with wide range of mechanical processes wishes to appoint a CHIEF ENGINEER to have full responsibility for design and maintenance of all plant and machinery and the initiation of new lines up to the point of full-scale production. Applicants should not be under age 35 and should have a university degree or similar professional qualifications. Salary between £2,250 and £2,750 will be paid dependent upon experience. Pension scheme in operation.—Please send particulars of age, education, qualifications and experience to Box B4646.

CHOCOLATE Department Chargehand. Must be conversant with all branches of Chocolate Production. Several Enrobers and Moulding machines installed. Please give fullest particulars, age, previous experience, positions held, wages received and required.—Box B4658.

CHEMIST for south Wales Food Products Manufacturers, experience of trade preferable, age 20/30, free of National Service. Salary commensurate with experience.—Full details in confidence to Box B4651.

BACON and Ham Curer for south Wales Food Manufacturing Co.—Full details of experience and salary required, to Box B4652.

ASSISTANT Factory Manager required for a Scottish Cannery by progressive firm of Canners. Single man preferred with experience Fruit and Vegetable Canning, Labour Control. Good prospects.—Apply full details in confidence to Box B4604.

EXPERIENCED Factory Manager with background of food industry, capable of taking responsbility for general administration and planning expansion of production and able to re-organise control of departments, including maintenance of plant and machinery. Commencing salary £1,750 per annum, or greater, depending on qualifications. Applications from men between the ages of 45 and 55 will be considered.—Box B4608.

MANAGER required for large canning factory in Cyprus. Must be fully experienced in all sections of the business.—Write stating experience, salary required to S. W. Smedley, 113, Wardour Street, London, W.1.

TO MANUFACTURERS OF PRE-PACKED FOOD LINES SUITABLE FOR THE RETAIL OR CATERING TRADE

Have you any dormant or slow selling goods that you wish to clear which are taking up valuable space? We are spot cash buyers for any quantity of the above.

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ADVERTISER having 30 years practical and administrative experience in the manufacturing of table jellies, jelly crystals, self-raising and cake flours, custard, blanc-mange, baking powders, soups and sauces and allied products, with good background of experience in the many aspects of food manufacturing, food packaging and personnel control, seeks position as Production Manager or would consider Management of Small Business with a view to development.—Box B4649.

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WELL KNOWN Scottish Pie Makers can offer attractive terms to Agents with own transport. Goods despatched to any part of the country by passenger train. Branded line, goods packed in cardboard cartons, each containing one dozen.—Trade inquiries to : V. C. Pies Ltd., Glasgow. Tel.: Maryhill 1048.

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MODERN Warehouse premises with covered loading and garage space situated in the centre of Newcastle Upon Tyne, already handling foodstuffs, have additional warehouse space and facilities for handling and distributing. Arrangements can be made to suit any firm's requirements.—Box 4636.

TO LET: Fh zero Cold Room 5,000 cu. ft. with small quick-freezing plant, offices and yard, 50 miles north London, long lease reasonable rent.—Box B4650.

BELGIUM Representation required for Food Specialities of all kinds.—Forton, 54, rue d'Ophem-Bruxelles.

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MANUFACTURER of Chocolate Spread and Syrup owing to retiring age, would either amalgamate with another Food Concern or would sell outright manufacturing plant, process and trademark together with or without freehold property of 1,600 square feet area, including offices. Principals only.—Box B4625.

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600

SPECIAL PURCHASE OF MODERN DRYING PLANT

TEN new and unused twin roll Spray Driers, with rolls 40 in. long by 32 in. diam., suitable for 60/80 lb. sq. in. W.P., fitted spray discs and air-cooled scrapers. Main drive for rolls is by 7-h.p. A.C. motor through reduction gearbox. Drier fitted with enclosed work discharge conveyors with ancillary equipment embracing two motor-driven air blowers, motor-driven 1¼ in. diam. stainless steel pump, jacketed feed tank approx. 54 in. by 37 in. by 26 in. deep, and motor-driven dresser for dried material, comprising 4 ft. long by 12 in. diam. phosphor bronze mesh covered screen, with spiral distributor to bagging-off outlet.

Four new and unused Vacuum Drying Ovens of mild steel welded construction, approx. 7 ft. long by 3 ft. 6 in. wide by 3 ft. 6 in. deep, fitted nine steam heated shelves to carry thirty-six acid resisting metal trays, 36 in. long by 16 in. wide by 1¾ in. deep. Davit swung door at each end, with hand wheel closing mechanism. Oven complete with set of thirty-six trays, motor-driven horizontal wet vacuum pump, pressure and vacuum gauges, and connecting piping.

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FOR Sale: Second-hand Mechanical Stoker (Neills Temple) in excellent condition to fit Lancashire boiler 9 ft. diameter. Reasonable price.—Box B4633.

250 and 500 gall. cylindrical stainless steel Tanks with agitators; 100 gall. oblong s.s. Tanks; Alite and Johnston " Lightning " Filling Machines; Pyramid electric Heat Sealers; Hunter " Emulsor " Emulsifiers and Homogenisers; Gardner Mixers, etc. Your enquiries invited.—Sorensen Bakery Equipment Ltd., Drake Street, Manchester 15. Tel.: CENtral 1353/4. Grams: Rahbek.

" BENHIL " Automatic Butter and Margarine Packing Machine complete with motor and starter. Perfect working order.—Sorensen's, Drake Street, Manchester 15. Tel.: CENtral 1353/4. 'Grams: Rahbek.

FOR Sale: One Mather and Platt left-hand Pea Podding Machine, capable of handling up to 40 tons of peas in pod per day, fitted with P.I.V. variable speed gear and 15 h.p. Star Delta start motor, all in good condition. Any reasonable offer will be considered.—Box B4635.

Powell & Co., 'Drum Master' Works, Burry Port, Carms.

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PHONE 98 Staines. 100 and 50 gall. stainless steel cyl enc. Mixers. 40, 50 and 60 gall. welded steel jac. Mixing Pans with elec. stirrer 400/3/50. Ditto, unjacketed. 7,000 gall. glass lined cyl Tanks, 1,500 gall. aluminium cyl. enc. Tanks. Jacketed " U " Trough Mixers 6 ft. 3 in. by 2 ft. 7 in. by 2 ft. 3 in. Unused portable Stirring Arms 2 ft. shaft, simple propeller, 400/3/50. (Thirty) Twin " Z " and Fin Blade Mixers up to 36 in. by 30 in. by 26 in. deep. Ditto, jacketed Vacuum 20 in. by 19 in. by 16 in. deep. Two retorts 24 in. by 30 in. with baskets. Ovens, Driers, Sifter Mixers, Pans, Hydros, Extruders, Boilers, Mincers, Edge Runners, Disintegrators, Pumps.—Harry H. Gardam and Co. Ltd., Staines.

GAS-FIRED Vertical Multitubular Steam. Boiler 48 in. by 19 in. diam., 100-lb. pressure. " Crypto " 3-speed 40 25-qt. electric Mixer and Mincer, 400-volt, 3-phase, excellent condition. 40-gall. steam c.i. jacketed copper Tilting Pan. 28 in. water and refrigerated Milk Cooler. 48-cu. ft. steam Sterilising Chest. —A. H. Kinnins and Sons Ltd., Lyndhurst Road, Worthing.

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TWO Braithwaite Rapid Jam Boiling Pans, 50 gall. capacity, suitable 70 lb. s.w.p. and fitted 2 in. bottom outlets. Kellie type 4 FP automatic Jam Filling Machine for 1 and 2 lb. jars. B.C.H. Black Currant Strigging Machine. —Apply Box B4654.

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FILM Drier, 10 ft. by 3 ft. 6 in. diam., fitted with 20 sprays, air compressor, fan etc. Twin Roll Film Drier, 5 ft. by 2 ft. 3 in. diam., triple roller feed.—Box B4647.

ALMOST New 6 in. triple cut Wetter Mincer 7½ h.p. 3-phase 400/440V Motor. Can be seen working. Space required. New price £350. To clear £125.—J. B. Food Products Ltd., 381 Albany Road, S.E.5. ROD. 5061.

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MEDICAL bottles; tablet bottles; jars; bottle closures, bakelite and metal purchased. Best prices paid.—Samples and full details in first instance to Noel Davold and Co., 9, Laurence Pountney Lane, Cannon Street, London, E.C.4. Tel.: MANsion House 3951-2.

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On View May 3, 4, 5 and 6 from 1 to 4 p.m. and morning of sale from 9 a.m.
Catalogues from the Joint Auctioneers: Shouler and Son, 1, Norman Street, Melton Mowbray. Tel.: 81. Kendells, Bradford Hall, Swindon. Tel.: 3597.

MELTON MOWBRAY
To be sold by auction by Shouler and Son, Wednesday, May 5, 1954, at their Auction Rooms, 1, Norman Street, Melton, at 2 p.m.
New and used Machinery and Stores
By direction of Messrs. Chappie Ltd., Cat and Dog Food Specialists, surplus to requirements, now lying at their Factory, Mill Street, Melton, including: Dryfood Extruder; Sizer Bowl Mixer; Horizontal "U" Mixer; Can Labelling and Elevating M/cs; Flat Wrapping, Bag Separator and Opener and Heat Sealing M/cs; Concrete or Grain Mixer; Steam Pan; El. Motors ½ to 60 h.p.; Reduction Gearboxes; El. Fittings; Vee Belts; 37 Roll Steel Joists; 1,500 ft. Piping; 1,000 Steel Floor Tiles; Canteen Fittings; Toilet Fittings; Paint, etc. View May 3, and 4 and morning of sale. Catalogues from Auctioneers' Offices, 1, Norman Street, Melton Mowbray.

HEDLEY VICKERS LIMITED
Sherborne Street, (Off Derby Street)
MANCHESTER
Edward Rushton Son and Kenyon are instructed to sell by auction, piecemeal, at 11 a.m. prompt on Wednesday, May 12th.

MEAT PROCESS AND CANNING MACHINERY AND OFFICE FURNITURE

including: Welded and riveted steel retorts, Wetter mincing machines, Morton and Hobart mixers, stainless steel and enamelled iron jacketed boiling pans, vacuum chambers, vacuum pumps, Hodgson weighing machines, Kelvinator refrigerators, circular pan choppers, Oliver band saw, electic motors, Hunts hand dough brakes, electric hand drill and tools, office furniture including time recorder, desks, tables, chairs, safes, typewriters etc.
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VANOLEUM
1 oz. (2/6) makes a pint of essence
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QUANTITY 0.00035 Foil/Paper Laminate for sale.—Write for details and samples, Box B4630.

APPLE Vinegar for sale in bulk. Bottling, labelling undertaken using customers materials or not as required. Please forward 2s. 6d. postal order for sample bottle.—F.M.S. (Farm Products) Ltd., Woofferton, Shropshire.

7 oz Salad Cream Bottles standard shape, unused with white enamelled aluminium lids. Approx. 100 gross to clear at 15s. per gross delivered free.—Box B4639.

APPROXIMATELY 1 ton Ginger Syrup 65° Brix ex London. What offers?—Box B4645.

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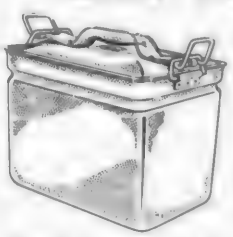

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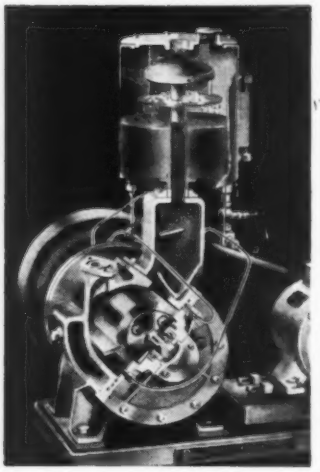

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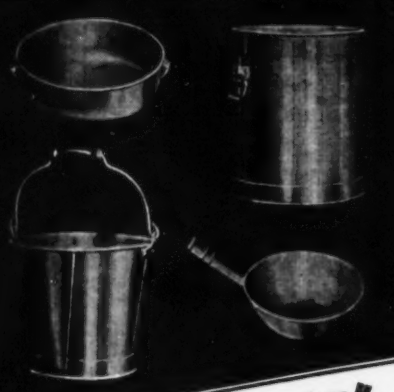

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